2.0 BACKGROUND INFORMATION REPORT

Background information was gathered to provide understanding of the existing conditions within the Dominguez Watershed. This information is summarized in the following six subsections:

- Subsection 2.1 - Physical Conditions
- Subsection 2.2 - Land Use
- Subsection 2.3 - Water Resources
- Subsection 2.4 - Biological Resources
- Subsection 2.5 - Socioeconomics
- Subsection 2.6 - Data Gaps

Existing conditions and resources were described based upon available data and reports gathered by the County of Los Angeles Department of Public Works (LACDPW) from the different jurisdictions within the watershed, and from other agencies and stakeholders. In addition, questionnaires were developed for land, water, and biology issue areas, and the responses to them by jurisdictions and other stakeholders were incorporated into the document. Field reconnaissance surveys were performed to gain additional understanding of water bodies and quality of habitats within the watershed. A Geographic Information System (GIS) database was developed by LACDPW for the gathered information, and served as the basis for most of the figures presented herein. Representative photographs from the reconnaissance surveys also are included in this document. At the end of this section, data gaps are listed that were identified during review of the background information.

2.1 Physical Conditions

The following topics are addressed in this section:

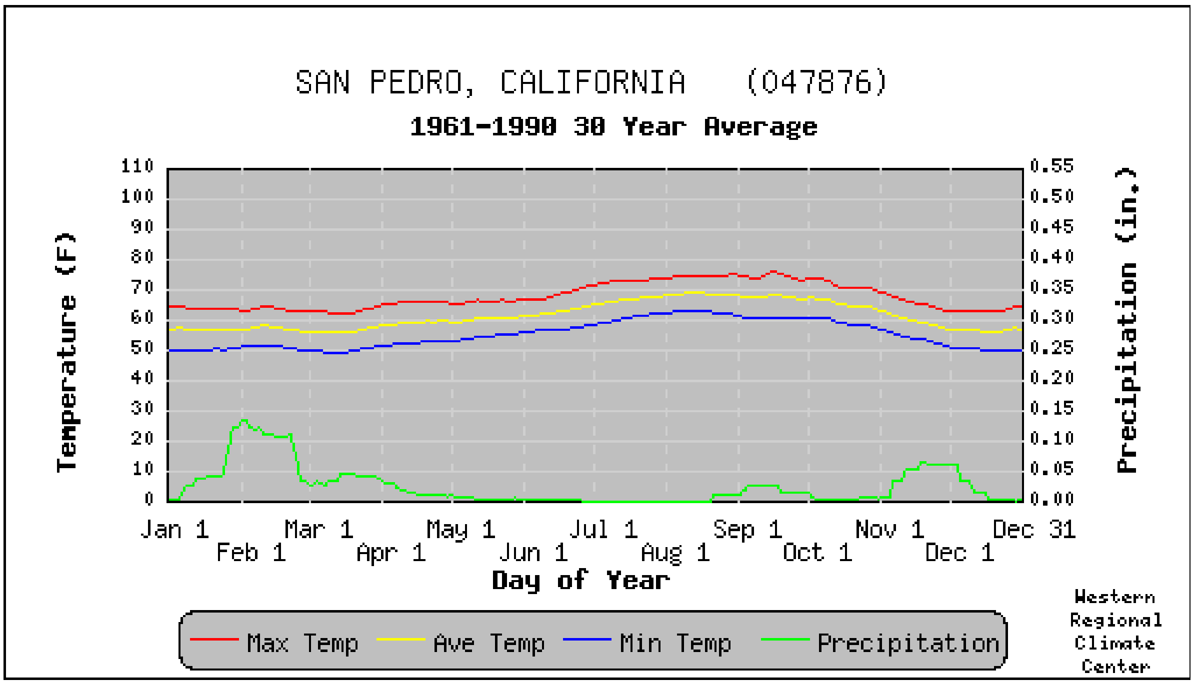
- Climate and air quality,
- Topography and physiography,
- Geology and soils, and
- Seismology.

2.1.1 Climate and Air Quality

2.1.1.1 Climate

Climatic elements are comprised of temperature, humidity, precipitation, cloudiness and solar radiation, wind, and inversions and mixing heights. Southern California lies in the semi-permanent high pressure zone of the eastern Pacific. Typical of coastal strips along the western shores of continents at lower latitudes, the region is characterized by sparse rainfall, most of it occurring in the winter season, and hot summers tempered by cooling sea breezes.

The climate of the region is Mediterranean like with warm summers and mild winters. The Dominguez Watershed experiences a fairly narrow spread between the warmest and coldest month with monthly mean temperatures along the coast being approximately 12 degrees higher during August than January (Figure 2.1-1). Reversals from the moderation of the climate by coastal waters can occur with the intrusion of continental air. Winter outbreaks of arctic air moving from the north can drop air temperatures in the basin, although this is more common in areas located away from the coast. Similarly, the continental influence can account for the highest temperatures of the year. Occasionally, continental air moves into southern California in the summer or early fall producing weak offshore flows of warm air that cancel out the sea breeze and its cooling effect. During those periods, temperatures can reach 100 degrees even near the coast.



Notes:
Data is smoothed using a 29-day running average.
– Max. Temp. is the average of all daily maximum temperatures recorded for the day of the year between the years 1961 and 1990.
– Ave. Temp. is the average of all daily average temperatures recorded for the day of the year between the years 1961 and 1990.
– Min. Temp. is the average of all daily minimum temperatures recorded for the day of the year between the years 1961 and 1990.
– Precipitation is the average of all daily total precipitation recorded for the day of the year between the years 1961 and 1990.

Figure 2.1-1. Long-term maximum, minimum, and average temperatures and average precipitation along the coast within the Dominguez Watershed.

Temperature range generally is less along the coast than inland due to the moderating influence of the ocean. Historical annual average maximum and minimum temperatures at San Pedro were 68.5 and 54.6 degrees Fahrenheit (20.2 and 12.5 degrees Centigrade), respectively (Table 2.1-1). At Torrance, historical average maximum and minimum temperatures were 72.4 and 52.7 degrees Fahrenheit (22.4 and 11.5 degrees Centigrade), respectively.

Table 2.1-1. Historical monthly climate summary for San Pedro and Torrance, California.

Parameter	San Pedro												
	Period of Record: 12/1/1927 to 8/31/1964												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	62.4	63.1	64.4	66.4	68.4	70.6	74.0	74.4	74.7	71.4	68.4	64.2	68.5
Average Min. Temperature (F)	47.3	48.4	49.9	52.3	55.1	58.1	61.2	62.2	60.5	57.4	52.8	49.5	54.6
Average Total Precipitation (in.)	2.12	2.57	1.59	0.88	0.20	0.06	0.00	0.02	0.11	0.27	0.97	2.03	10.82
Parameter	Torrance												
	Period of Record: 1/1/1949 to 12/31/2001												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	66.1	67.2	67.6	70.2	71.8	74.5	78.2	79.4	78.7	76.4	71.6	67.3	72.4
Average Min. Temperature (F)	44.8	46.3	47.4	50.1	53.9	57.0	60.5	61.5	60.1	56.0	49.6	45.3	52.7
Average Total Precipitation (in.)	3.41	2.82	2.18	0.87	0.19	0.06	0.02	0.08	0.18	0.31	1.51	1.87	13.51

Percent of possible observations for period of record.
Max. Temp.: 98.5% Min. Temp.: 98.4% Precipitation: 99.2%
F = Fahrenheit (to obtain centigrade, subtract by 32 then multiply by 0.555)
In = inch (to obtain centimeters, multiply by 2.54)

Source: Western Regional Climate Center, wrcc@dri.edu

Relative humidity is a percentage reflecting the ratio between the amount of water existing in the air and the total water vapor the air could hold at a given temperature and pressure. South Coast Air Quality Management District (SCAQMD) data show that the highest annual mean relative humidities are at the coast at approximately 72 percent and decrease inland to about 58 percent. Average relative humidities are fairly constant in the South Coast Air Basin month to month, but peak slightly during the spring when the marine layer is deepest and most persistent.

Rainfall in the South Coast Air Basin is characterized by some degree of variability both annually and seasonally. However, the rainy and dry seasons are fairly constant, with rain generally extending from November through April. It is during this period that more than 90 percent of annual rainfall typically occurs. Rainfall records from eleven recording sites in and near the Dominguez Watershed indicate that the watershed receives approximately 30.7 centimeters (12.1 inches) of rainfall per year on average. As indicated in Figure 2.1-2, only 4 percent of the yearly total rain falls during the months of May to September. Exceptions to this generally are associated with El Niño, which can result in strong intensity storms with higher than average precipitation and high waves.

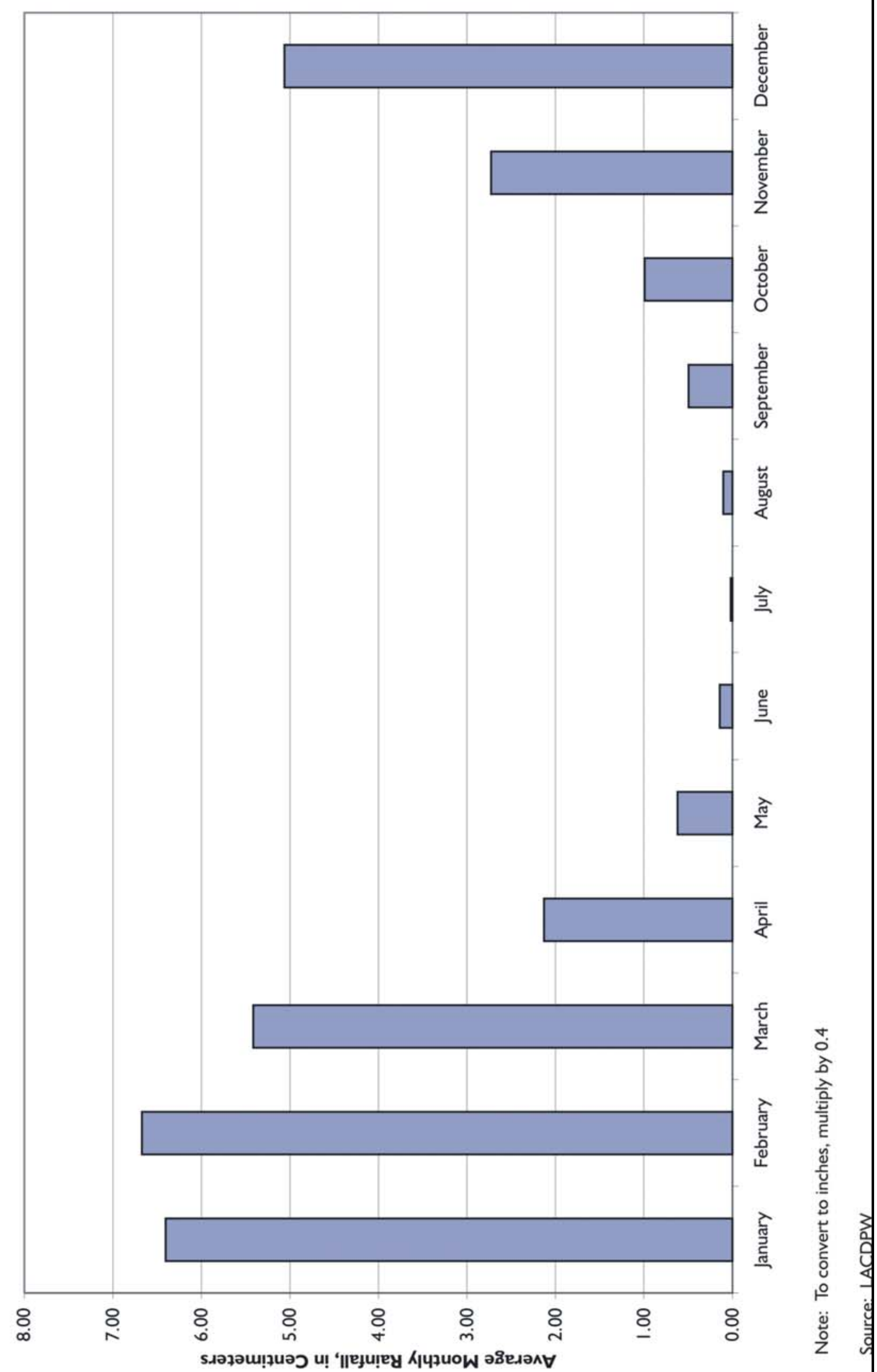


Figure 2.1-2. Dominguez Watershed average monthly rainfall.

Similar to temperature, rainfall is less near the coast than further inland (Tables 2.1-1). Isohyets (lines of equal rainfall) for the 50-year "design storm" predict over an inch difference in rainfall between the eastern central portion of the watershed and the coast (Figure 2.1-3). The figure illustrates that up to 13 to 15 centimeters (5 to 6 inches) of rain over a 24-hour period would result in flood flows that would be contained within the design of the flood control channel conveyance system.

During spring and summer, the predominant wind flow in coastal waters is from the northwest. The ocean flow resulting from this wind pattern is a drift of warm surface water seaward to the southwest. This surface water is then replaced by cold water from below, a process called "upwelling." The cold ocean surface caused by upwelling underlies warm, descending air on the eastern side of the high pressure system and produces, by cooling and turbulent mixing, a persistent layer of marine air based at the ocean surface. The top of this marine layer defines the base of the temperature inversion above which the air is warm and dry.

During the late-autumn to early-spring rainy season, the basin is subjected to wind flows associated with traveling storms moving through the area from the north-west. This period also brings a few days of strong Santa Ana winds each year. But during the dry season that coincides with the months of maximum smog concentrations, the wind flow is typified by a day-time sea breeze and a night-time land breeze. This daily reversing flow is most predominant during the summer but also occurs during the rest of the year.

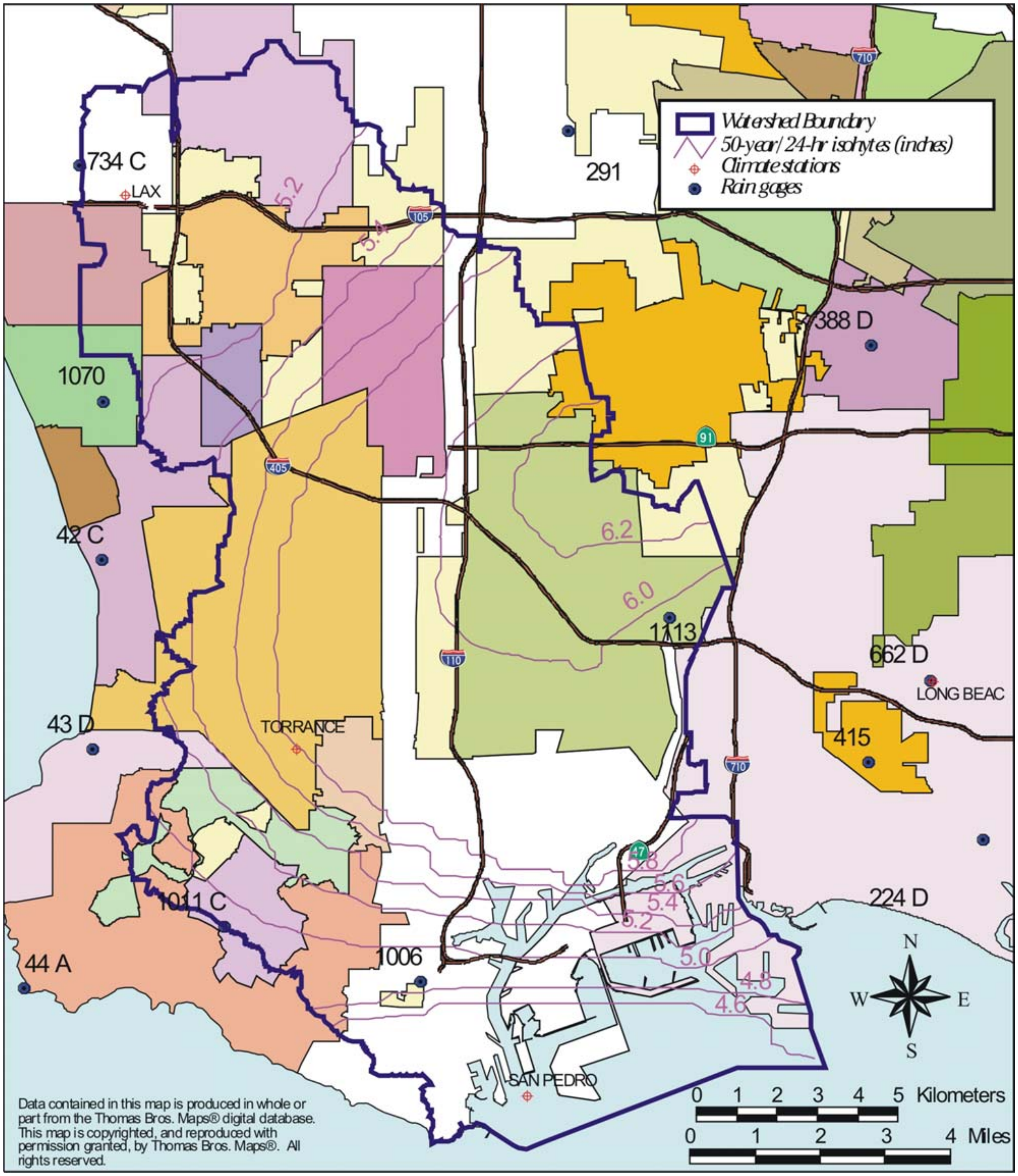
2.1.1.2 Air Quality

"Air pollution" is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants may adversely affect human or animal health, reduce visibility, damage property, and reduce the productivity or vigor of crops and natural vegetation.

Seven air pollutants have been identified by the U.S. Environmental Protection Agency (EPA) as being of concern nationwide:

- Carbon monoxide (CO).
- Lead (Pb).
- Nitrogen dioxide (NO_2).
- Ozone (O_3).
- Particulate matter equal to or less than 10 microns in size (PM_{10}), which is also called respirable particulate.
- Fine particulate matter equal to or less than 2.5 microns in size ($PM_{2.5}$).
- Sulfur dioxide (SO_2).

These pollutants are collectively referred to as criteria pollutants. A brief description of each of these pollutants, applicable air quality standards promulgated by the federal and state government, and monitoring results from an air quality monitoring station within the watershed are provided below.



Note: To convert to centimeters, multiply by 2.54

Figure 2.1-3. Isohyetal map of precipitation for the Dominguez Watershed associated with a 50-year, 24-hour rainfall "design storm."

Overview of Criteria Pollutants

Carbon Monoxide (CO)

Carbon monoxide is a colorless and odorless gas, which, in the urban environment, is associated primarily with the incomplete combustion of fossil fuels in motor vehicles. Relatively high concentrations are typically found near crowded intersections and along heavily used roadways carrying slow-moving traffic. Even under the most severe meteorological and traffic conditions, high concentrations of CO are limited to locations within a relatively short distance (91.44 to 182.88 meters [300 to 600 feet]) of heavily traveled roadways. Overall CO emissions are decreasing as a result of the Federal Motor Vehicle Control Program, which has mandated increasingly lower emission levels for vehicles manufactured since 1973. Carbon monoxide concentrations are typically higher in winter. As a result, California has required the use of oxygenated gasoline in the winter months to reduce CO emissions. Carbon monoxide interferes with the transfer of oxygen to the blood. It may cause dizziness and fatigue and can impair central nervous system functions.

Lead (Pb)

The lead used in gasoline anti-knock additives represented a major source of lead emissions to the atmosphere. This metal persists and accumulates both in the environment and in animals. However, lead emissions have significantly decreased due to the near elimination of the use of leaded gasoline.

Nitrogen Dioxide (NO_2)

NO_2 along with some NO is emitted from motor vehicle engines, power plants, refineries, industrial boilers, ships, aircraft, and railroads. Nitrogen dioxide is the brown-colored gas readily observed during periods of heavy air pollution. Nitrogen dioxide is primarily formed when NO reacts with atmospheric oxygen in the presence of reactive organic compounds (ROC) and sunlight; the other product of this reaction is ozone, see below. Nitrogen dioxide causes respiratory irritation and may reduce resistance to certain infections.

Ozone (O_3)

Ozone is the principal component of smog and is formed in the atmosphere through a complex series of photochemical reactions involving ROC and nitrogen oxides (NO_x), which are commonly referred to as precursors of O_3. NO_x includes various combinations of nitrogen and oxygen, including NO, NO_2, NO_3, etc. Significant O_3 production generally requires about three hours in a stable atmosphere with strong sunlight. Ozone is a regional air pollutant because it is transported and diffused by wind concurrent with the photochemical reaction process. Motor vehicles are the major source of ozone precursors in the air basin. During late spring, summer, and early fall, light winds, low mixing heights, and abundant sunshine combine to produce conditions favorable for maximum production of O_3. Ozone causes eye and respiratory irritation, reduces resistance to lung infection, and may aggravate pulmonary conditions in persons with lung disease. Ozone is also damaging to vegetation and untreated rubber.

Respirable Particulate Matter (PM_{10})

Respirable particulate matter refers to particulates equal to or less than 10 microns in diameter -- those which can be inhaled and cause health effects. Particulates in the atmosphere result from many kinds of dust- and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, demolition, construction, and vehicular traffic. Natural sources of particulates include wind-blown dust and ocean spray. Very small particulates of certain substances can cause direct lung damage or can contain absorbed gasses that may be injurious. Particulates can also damage materials and reduce visibility.

Fine Particulate Matter ($PM_{2.5}$)

$PM_{2.5}$ is defined as fine particulate matter equal to or less than 2.5 microns in size. The sources and health effects of $PM_{2.5}$ are similar to those of PM_{10}.

Sulfur Dioxide (SO_2)

Sulfur dioxide is a combustion product, with the primary source being power plants and heavy industry that use coal or oil as fuel. Sulfur dioxide is also a product of diesel engine combustion. The health effects of SO_2 include lung disease and breathing problems for asthmatics. Sulfur dioxide in the atmosphere contributes to the formation of acid rain. In the South Coast Air Basin, there is relatively little use of coal and oil, and SO_2 is of lesser concern than in many other parts of the country.

The criteria pollutants that are most important for this air quality discussion are those that can be traced principally to motor vehicles. Of these pollutants, CO, ROC, NO_x, and PM_{10} are evaluated on a regional or "mesoscale" basis. Carbon monoxide is often analyzed on a localized or "microscale" basis in cases of congested traffic conditions. Although PM_{10} has very localized effects, there is no EPA approved methodology to evaluate microscale impacts of PM_{10}. Methods for analysis of $PM_{2.5}$ are anticipated within the next few years, as implementation of the new standard progresses.

Air Quality Standards

The Federal Clean Air Act (42 U.S.C. §§ 7401-7671q) requires the adoption of national ambient air quality standards (NAAQS) to protect the public health and welfare from the effects of air pollution. The NAAQS have been updated as needed. Current standards are set for SO_2, CO, NO_2, O_3, PM_{10}, $PM_{2.5}$, and Pb. The State of California Air Resources Board (CARB) has established additional standards which are generally more stringent than the NAAQS. Federal and state standards are shown in Table 2.1-2. Areas are classified under the Federal Clean Air Act as either "attainment" or "nonattainment" areas for each criteria pollutant based on whether the NAAQS have been achieved or not.

Air Quality Monitoring

The Clean Air Act requires a demonstration that federal actions conform to State Implementation Plans (SIP) and similar approved plans in areas that are designated as nonattainment. In the South Coast Air Basin, the SCAQMD is the agency responsible for the administration of federal and state air quality laws, regulations, and policies for Orange County, Riverside County, San Bernardino County, and portions of Los Angeles County.

Included in the SCAQMD's tasks are monitoring of air pollution, preparation of the SIP for the South Coast Air Basin, and the promulgation of its Rules and Regulations. The SIP includes strategies and tactics to be used to attain the federal O_3 standard in the Los Angeles and Orange County South Coast Air Basin area. The SIP elements are taken from the 1997 Air Quality Management Plan (AQMP), the SCAQMD plan for attaining the state O_3 standard. The Rules and Regulations include procedures and requirements to control the emission of pollutants and to prevent adverse impacts. SCAQMD regulations require that any equipment that emits or controls air contaminants, such as NO_x and ROC be permitted prior to construction, installation, or operation (Permit to Construct or Permit to Operate). The SCAQMD is responsible for review of applications and for the approval and issuance of these permits.

Table 2.1-2. California and National Ambient Air Quality Standards.

Pollutant	Averaging Time	California Standards[1] Concentration[3]	National Standards[2] Primary[3,4]	National Standards[2] Secondary[3,5]
Ozone (O_3)	1 Hour	0.09 ppm (180 $\mu g/m^3$)	0.12 ppm (235 $\mu g/m^3$)[6]	Same as Primary Std.
	8 Hour	--	0.08 ppm[6] (157 $\mu g/m^3$)	
Carbon monoxide (CO)	8 Hour	9.0 ppm (10 mg/m^3)	9.0 ppm (10 mg/m^3)	--
	1 Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)	--
Nitrogen dioxide (NO_2)	Annual Arithmetic Mean	--	0.053 ppm (100 $\mu g/m^3$)	Same as Primary Std.
	1 Hour	0.25 ppm (470 $\mu g/m^3$)	--	--
Sulfur dioxide (SO_2)	Annual Arithmetic Mean	--	0.03 ppm (80 $\mu g/m^3$)	--
	24 Hour	0.04 ppm (105 $\mu g/m^3$)	0.14 ppm (365 $\mu g/m^3$)	--
	3 Hour	--	--	0.5 ppm (1300 $\mu g/m^3$)
	1 Hour	0.25 ppm (655 $\mu g/m^3$)	--	--
Respirable particulate matter (PM_{10})	24 Hour	50 $\mu g/m^3$	150 $\mu g/m^3$	Same as Primary Std.
	Annual Arithmetic Mean	20 $\mu g/m^{3*}$	50 $\mu g/m^3$	Same as Primary Std.
Fine particulate matter ($PM_{2.5}$)[6]	24 Hour	--	65 $\mu g/m^3$	Same as Primary Std.
	Annual Arithmetic Mean	12 $\mu g/m^{3*}$	15 $\mu g/m^3$	
Lead (Pb)[7]	30 Day Average	1.5 $\mu g/m^3$	--	--
	Calendar Quarter	--	1.5 $\mu g/m^3$	Same as Primary Std.
Sulfates (SO_4)	24 Hour	25 $\mu g/m^3$		
Hydrogen sulfide (H_2S)	1 Hour	0.03 ppm (42 $\mu g/m^3$)		
Vinyl chloride[7]	24 Hour	0.01 ppm (26 $\mu g/m^3$)		
Visibility reducing particles	8 Hour (10 am-6 pm, Pacific Standard Time)	Extinction coefficient of 0.23 per kilometer- visibility of ten miles or more due to particles when relative humidity is less than 70 percent.	No Federal Standards No Federal Standards	

Notes:
$\mu g/m^3$ = micrograms per cubic meter, ppm = parts per million
1 = California standards for ozone, carbon monoxide, sulfur dioxide (1-hour), nitrogen dioxide, and PM_{10} suspended particulate matter are values that are not to be exceeded. The sulfates, lead, and visibility reducing particles standards are not to be equaled or exceeded.
2 = National standards, other than ozone and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one.
3 = The concentration is expressed first in units in which it was promulgated. Equivalent units given in parentheses are based on a reference temperature of 25°C and a reference concentration of 760 mm of mercury (1,013.2 millibar).
4 = National Primary Standards: the levels of air quality necessary, with an adequate margin of safety, to protect public health. Each state must attain the primary standards no later than 3 yeas after that state's implementation plan is approved by the EPA.
5 = National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a reasonable time after the implementation plan is approved by the EPA.
6 = ppm in this table refers to parts per million by volume, or micromoles of pollutant per moles of gas.
7 = The CARB has identified lead and vinyl chloride as 'toxic air contamiants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

Source: CARB 2003a

One air quality monitoring station, City of Hawthorne (5234 W 120th Street), is located within the Dominguez Watershed. Data for the last five years are given in Table 2.1-3. This portion of the Los Angeles County air basin is currently classified as a federal and state nonattainment area for O_3, CO, and PM_{10}. The air basin currently meets the federal and state standards for NO_2, SO_2, and Pb and is classified as an attainment area for these pollutants.

Restoration projects may require consultation with and approval by local and state jurisdictions, if applicable, to ensure compliance with circulation plans, which seek to minimize sources of air pollution.

2.1.2 Topography and Physiography

The physiography of the Dominguez Watershed is composed of low hills and drainages that direct the flow of runoff waters (Figure 2.1-4). Much of the area consists of gently rolling plains between low hills through which the Dominguez Channel flows. In the northern and eastern portions of the watershed, the Rosecrans and Dominguez Hills rise to about 61 meters (200 feet) elevation. In the southwest portion of the watershed, the Palos Verdes Hills rise to an elevation of 451 meters (1,480 feet) and contain numerous small streams and drainages.

2.1.3 Geology and Soils

2.1.3.1 Regional and Local Geology

The Dominguez Watershed is located on the Los Angeles Coastal Plain in the western portion of the Transverse Ranges Geomorphic Province (Figure 2.1-5). The Transverse Ranges province is split by the unstable San Andreas Fault, which makes up the boundary of the Pacific and the North American tectonic plates. The compression of these two tectonic plates created uplift that formed the Transverse Ranges. The San Andreas Fault makes an east-west bend (known as the “Big Bend”) along the Transverse Ranges, and this east-west trend of the mountains is in contrast to most other mountain ranges in the continental United States, which generally run north-south (LARWQCB 1994). The San Gabriel, Santa Ana, and San Jacinto Mountains rise to over 3,048 meters (10,000 feet) elevation within 48 kilometers (30 miles) to the northeast of Dominguez Channel, forming the headwaters of numerous rivers that flow across the Los Angeles Coastal Plain and discharge to the Pacific Ocean.

Sediments in the Los Angeles Basin were deposited in the Miocene Epoch 5 million to 23.5 million years ago, when sea levels rose to cover the basin floor (LARWQCB 1994). Initially, fine particulate marine sediments were deposited, and then as sea levels dropped, coarser particulate sediments were eroded from the local mountain ranges. These eroded sediments formed stratified alluvial fans up to 9,754 meters (32,000 feet) deep on the Los Angeles Coastal Plain from the late Cretaceous Period to the Holocene Epoch. Thus, the soils on the coastal plain are mostly composed of fast draining alluvium, with subsurface clay layers underlying much of the area. The clay layers prevent percolation of rainwater, and allow the formation of large perched aquifers that are a substantial source of groundwater in the region (see Section 2.3.3). In addition to the Tertiary alluvium of the coastal plain, soils in the Dominguez Watershed include Quaternary non-marine terrace deposits. These deposits cover the Palos Verdes Hills area and the area between Inglewood and Long Beach (EIP 2002). The most recent deposits are composed of Holocene and Recent coarse cobble gravels that were backfilled by rises in sea levels, and fine sands, silts, and clays deposited by river flows (Zielbauer et al. 1962).

Table 2.1-3. Hawthorne Monitoring Station – Ambient Air Quality Data Summary, 1997-2001.

Pollutant	Averaging Time	California Air Quality Standards	Federal Primary Standards	Maximum Concentrations[1]					Number of Days Exceeding Federal Standard[2]					Number of Days Exceeding State Standard[2]				
				1997	1998	1999	2000	2001	1997	1998	1999	2000	2001	1997	1998	1999	2000	2001
O_3	1 hour	0.09 ppm	0.12 ppm	0.113	0.089	0.154	0.095	0.098	0	0	1	0	0	6	0	1	1	1
	8 hours	--	0.08 ppm	0.089	0.069	0.084	0.075	0.079	2	0	0	0	0	--	--	--	--	--
CO	8 hours	9.0 ppm[3]	9.0 ppm	10.31	9.50	8.43	7.14	5.21	1	1	0	0	0	1	1	0	0	0
NO_2	1 hour	0.25 ppm	--	0.164	0.150	0.134	0.128	0.110	--	--	--	--	--	0	0	0	0	0
	Annual	--	0.053 ppm	0.028	0.029	0.029	0.027	0.024	--	--	--	--	--	0	0	0	0	0
PM_{10}	24 hours	50 $\mu g/m^3$	150 $\mu g/m^3$	79.0	66.0	69.0	74.0	75.0	0	0	0	0	0	24	37	33	54	48
	Annual/AAM[4]	20 $\mu g/m^3$	50 $\mu g/m^3$	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
SO_2	1-Hour	0.25 ppm (665$\mu g/m^3$)	--	na	na	na	na	na	--	--	--	--	--	na	na	na	na	na
	24-Hour	0.04 ppm (105$\mu g/m^3$)	0.14 ppm (365$\mu g/m^3$)	0.015	0.013	0.019	0.016	0.009	0	0	0	0	0	0	0	0	0	0
	Annual/AGM[4]	--	0.03 ppm (80$\mu g/m^3$)	0.002	0.004	0.004	0.003	0.004	0	0	0	0	0	--	--	--	--	--

Notes:

(1) Concentration units for O_3, CO, and NO_2 are in parts per million (ppm). Concentration units for PM_{10} are in micrograms per cubic meter ($\mu g/m^3$).

(2) For PM_{10}, calculated days are the estimated number of days that a measurement would have been greater than the level of the standard had measurements been collected every day. The number of days above the standard is not necessarily the number of violations of the standard for the year.

(3) Prior to 1997, the state standard was 9.1 ppm.

(4) AAM = annual arithmetic mean; AGM = annual geometric mean.

na = data not available

Source: CARB 2003b

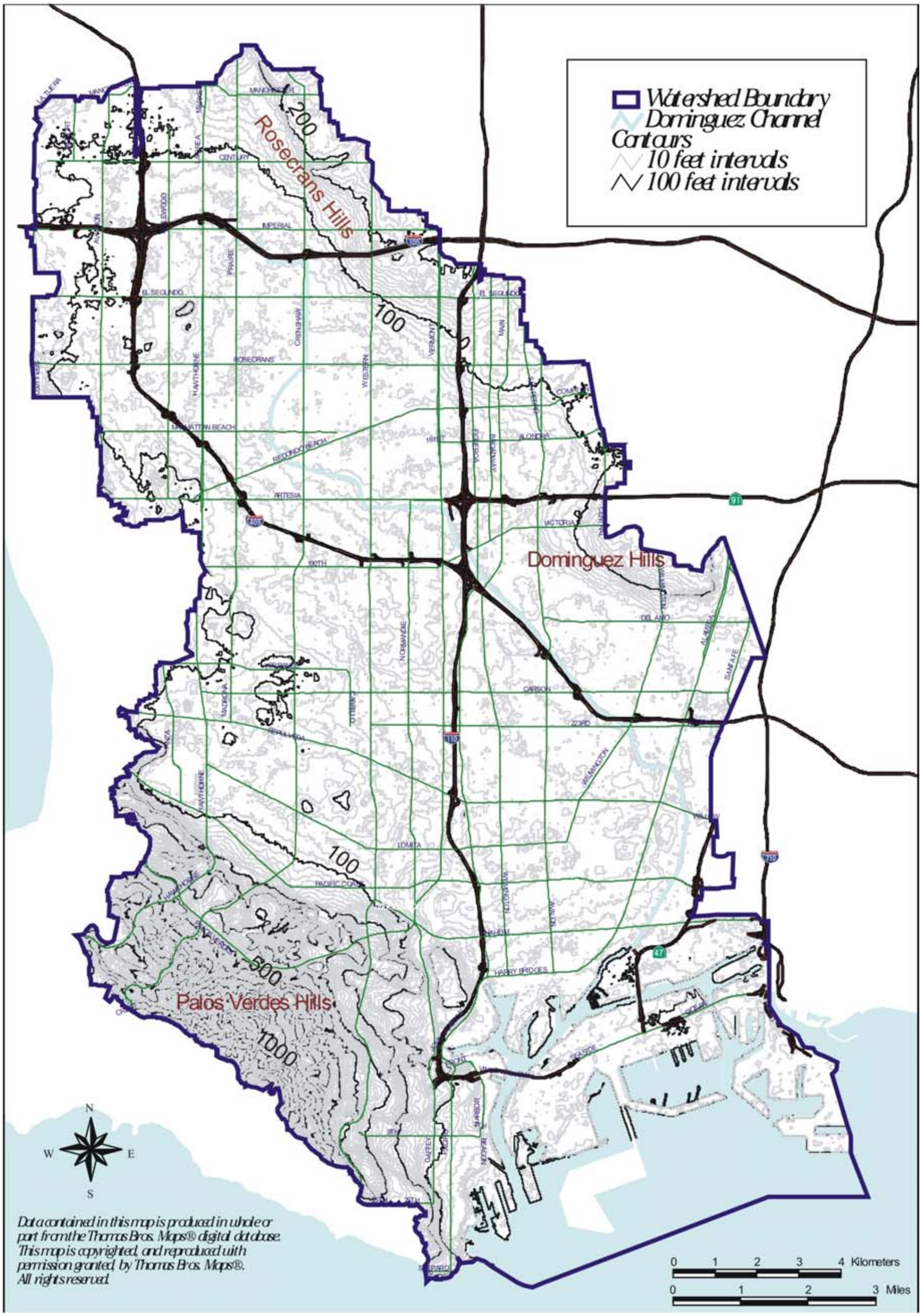
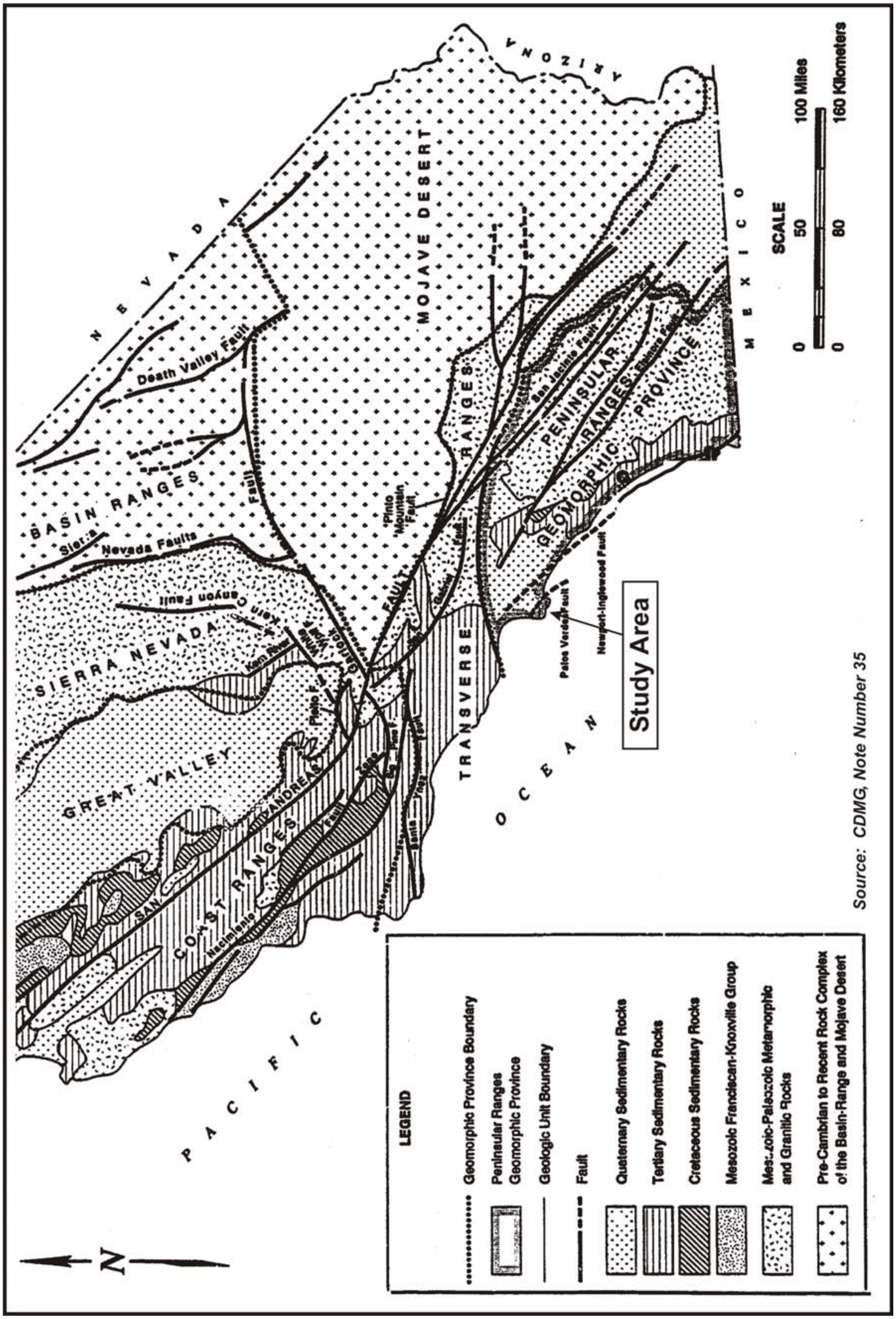


Figure 2.1-4. Topography within the Dominguez Watershed.



Source: CDMG, Note Number 35

Figure 2.1-5. Geomorphic setting of the region.

2.1.3.2 Soils

Soils have varying capacities to settle, erode, and support biological resources depending upon the percent composition of sand, silt, and clay, the level of organic content, and the degree of consolidation. Therefore, soil type is of concern relative to potential development or restoration projects. Soil parameters to consider include erodability, shrink-swell potential, subsidence, permeability, and infiltration rates.

As a general rule, sandy, unconsolidated soils have a greater tendency to erode than compacted clay dominated soils. The shrink-swell potential is the potential of a soil to expand with hydration and shrink with de-hydration. Soils with a high clay content have a high shrink-swell potential. Because expansive soils can damage roads and building foundations when not compensated for, shrink-swell potential is an important factor when planning construction projects.

Subsidence or settlement of the ground surface can be another important issue for construction projects. Subsidence has occurred in vicinity of the harbors due to the removal of oil, gas, and groundwater. Mitigation in the form of water injection has been successful in countering subsidence (LAHD 2002).

Soil type is also an important determinant in the colonization potential of vegetation. Loamy soils generally support more robust plant communities, although various plant species have adapted to nearly all soil types.

Soil types and distributions in the Dominguez Watershed are shown in Figure 2.1-6 and a listing of the soil types and their characteristics is given in Table 2.1-4. Abundant soil types in the watershed include Diablo Clay Loam, Ramona Loam, and Ramona Sandy Loam. These soil types vary in erosion potential from slight to severe. The Palos Verdes Hills area in the southwest portion of the watershed is dominated by soils with considerable clay content (Altamont clay loam, Diablo clay loam, and Montezuma clay adobe), indicating that shrink-swell potential is an important consideration in this area.

Most of the remaining watershed areas contain alluvial soils (e.g., Ramona loam, Ramona sandy loam, Oakley fine sand) with moderate to severe erosion and slow to rapid runoff potentials depending on slope. However, the low gradient of most of the watershed would favor low to moderate shrink-swell potentials, moderate permeability, and slower runoff rates.

2.1.3.3 Contaminated Soils

The presence of soils contaminated with hazardous materials has been recorded at several sites within the Dominguez Watershed. Contaminants of particular concern include volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), heavy metals (e.g., copper, lead, mercury), and pesticides (e.g., DDT).

Some known sites with contaminated soils are identified below, however a comprehensive listing is unavailable at this time, and development projects must be undertaken on a site-by-site basis regarding the possibility of soil contamination.

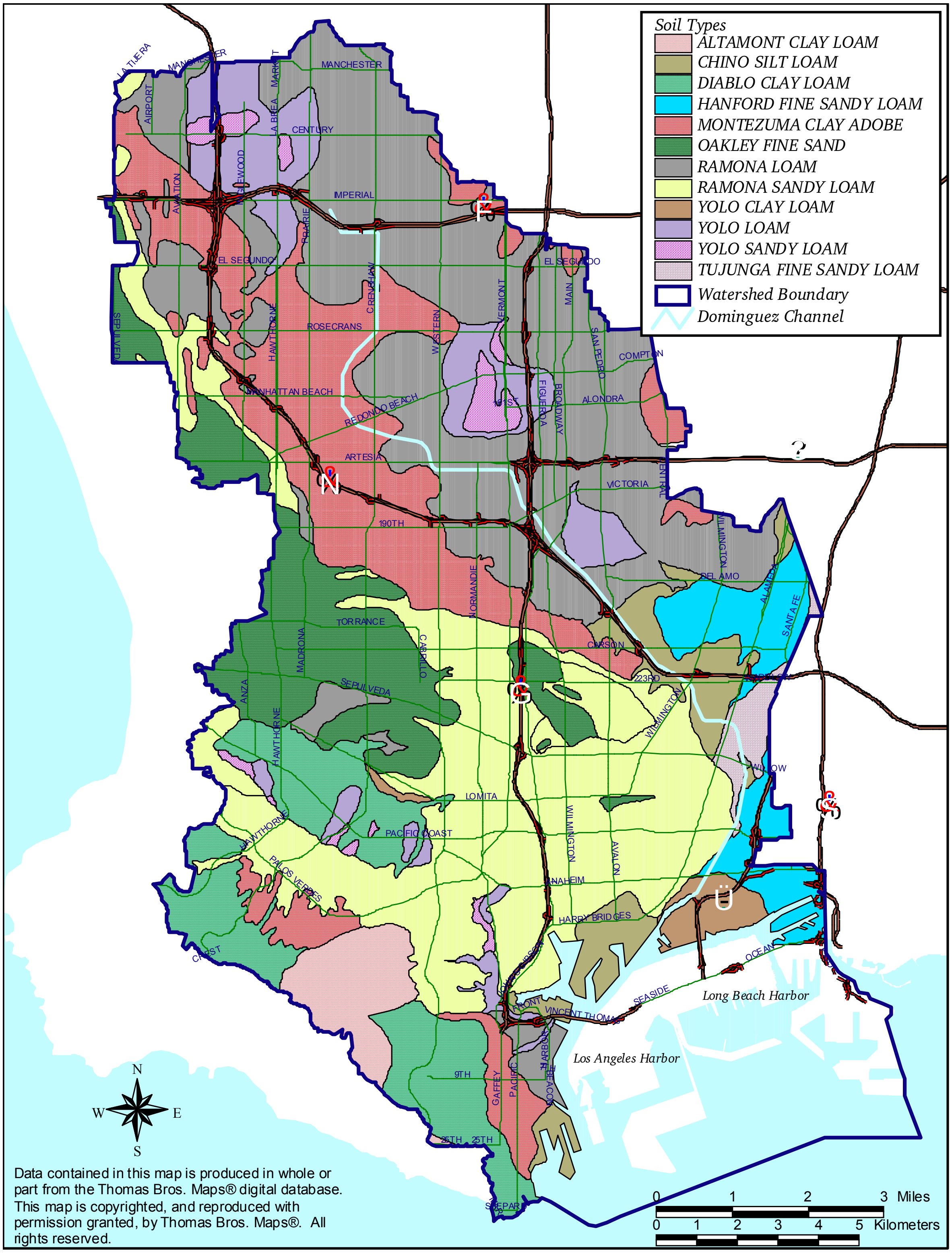


Figure 2.1-6. Soil types within the Dominguez Watershed.

Table 2.1-4: Soil types in the Dominguez Watershed

Soil type	General Characteristics	Erodability by Water	Shrink-Swell Potential	Permeability	Runoff
Altamont Clay Loam	Well-drained clay	Slight-Moderate	High	Slow	Medium to rapid
Chino Silt Loam	Moderately well drained fine sandy loams	Moderate-Severe	Moderate	Moderately Slow	Slow to very slow
Diablo Clay Loam	Well drained clay	Slight-Severe	High	Slow	Slow (dry) to rapid (wet)
Hanford Fine Sandy Loam	Well drained sandy loams	Moderate-Severe	Low	Rapid	Very slow
Montezuma Clay Adobe	Excessively drained clays	Slight	High	Rapid	Very slow to slow
Oakley Fine Sand	Well drained sand	Severe	Low	Moderate to moderately slow	Slow to rapid on steep slopes
Ramona Loam	Well-drained sandy loams	Severe	Moderate	Moderately slow	Slow to rapid
Ramona Sandy Loam	Well-drained sandy loams	Severe	Moderate	Moderately slow	Slow to rapid
Yolo Clay Loam	Well drained loam	Moderate	Moderate	Moderate	Slow to moderate
Yolo Loam	Well drained loam	Moderate	Moderate	Moderate	Slow to moderate
Yolo Sandy Loam	Well drained loam	Moderate	Moderate	Moderate	Slow to moderate
Tujunga fine Sandy Loam- Sandy Loam	Excessively drained sands	Severe	Low	Rapid	Negligible to very slow

Sources: LACDPW 2001b, USDA-NRCS 2003

<u>Superfund Sites</u>

Congress established the Superfund Program in 1980 to locate, investigate, and clean up the worst hazardous wastes sites nationwide. The Superfund program uses a variety of classifications to distinguish contaminated hazardous waste sites. Superfund Site Classifications include Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) sites, the National Priorities List (NPL), sites, and brownfield sites. The NPL is the list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The NPL guides the EPA in determining which sites warrant further investigation.

The Dominguez Watershed contains two NPL sites: the Montrose Chemical Corporation site and the Del Amo Facility site. EPA has funds to investigate these sites. The Montrose Chemical Corporation manufactured DDT on a thirteen-acre site in a light industrial/residential area in the City of Torrance from 1947 until 1982. The contaminants of concern at the Montrose Chemical Site are DDT, chlorobenzene (the raw material used to make DDT) and benzene hexachloride (BHC), another pesticide. DDT, banned in 1972, is a persistent chemical and adheres strongly to soil. BHC is a fairly persistent chemical that also adheres strongly to soil. Unlike these two pesticides, chlorobenzene tends to evaporate in open air. It dissolves only slightly in water, but it takes a very small amount (0.1 mg/L [ppm]) to make the water unsafe by EPA standards for drinking (USEPA 2003).

Sampling studies by EPA, Montrose, and various other agencies have found DDT in: (1) soils at the former Montrose plant site and surrounding areas, (2) sediments and soils in the historical storm water pathway, and (3) in groundwater very close to the former plant property. EPA has found chlorobenzene and BHC primarily in soil only under the former plant property itself.

Soils at the former Montrose plant property are contaminated with DDT at soil levels averaging about 1000 – 2000 ppm and up to several tens of thousands of ppm. Depths of DDT soil contamination extend 0.9 to 1.8 meters (3 to 6 feet) in most cases (USEPA 2003). In 1985, without EPA approval, Montrose dismantled the plant and built a temporary asphalt cover. It has since been enlarged to ensure that the high concentration of DDT in surface soils at and the former plant cannot be disturbed by wind or storm water runoff, the identified transport mechanisms for DDT. The property is still vacant.

The Del Amo Site is located 600 feet east of the Montrose site. From the 1940s to the 1970s, a 113-hectare (280-acre) synthetic rubber manufacturing facility operated on the property. The contaminants of concern at the Del Amo site are VOCs, including benzene and toluene, PAHs, and semi-volatile organic compounds (SVOCs). Floating products, including benzene and petroleum, have also been identified on top of the water table at various locations on the site (see Section 2.3.4.4).

Brownfield Sites

Brownfield sites refer to property where redevelopment or reuse may be complicated by the presence or suspected presence of a hazardous substance, pollutant, or contaminant. Brownfields may provide opportunities for restoration to open space and/or redevelopment with appropriate clean up.

Cities, however, often hesitate to publish lists of these locations because identification of "blighted" properties could cause harm to real-estate interests. There is no unified data source that identifies the level of contamination or lack of contamination at brownfield sites. This analysis must be done on a case by case basis with a Phase I survey (S. Andrews, Community Redevelopment Agency, personal communication 2003). Published city maps may only identify the brownfield lands that are in ownership transition or are under litigation. These lands represent less than one percent of the brownfield lands that may exist.

Perhaps the best indicator of potential brownfield sites are through the EPA's interactive brownfields map at http://map5.epa.gov/enviromapper. This is a database of locations that met the brownfields tax incentive requirements for geographic location between 1997 and 2000 throughout the United States. Hundreds of locations, their previous or current land use, their ownerships, and contact information are provided online. The interactive map allows these sites to be located within a given radius of other known locations such as schools, streams or streets. (The restrictions on geographic area for eligibility to the brownfields redevelopment tax incentives were lifted in 2000, so this map may under-represent the potential locations.)

Numerous brownfield sites were identified on EPA's map throughout the watershed, and several potential brownfield sites occur within the Ports of Los Angeles and Long Beach. The City of Carson identified two brownfield sites with high potential for redevelopment in response to the land use questionnaire submitted to jurisdictions during the information-gathering phase for this project. In addition, the City of Los Angeles lists about 30 to 40 brownfields on their website, some of which are in the Dominguez Watershed. Other examples of other brownfield sites include twelve sites tested in the City of Torrance in the vicinity of the ExxonMobil Refinery and the Dow Chemical facility. The soil samples contained petroleum hydrocarbons and VOCs (EDAW 2002). The Pacific Corridor Redevelopment Project Draft EIR (THA 2001) identified the presence of contaminated soil at several unspecified existing commercial and industrial sites. Additional research would be required to determine if there are brownfield sites within the watershed that may be appropriate to consider for restoration to open space and/or recreational uses.

2.1.4 Seismology

Seismic activity and earthquakes occur frequently in southern California, and particularly in the Los Angeles Basin, where many strike-slip and reverse faults accommodate the complex tectonic stresses associated with the convergence of the North American and Pacific Plates. From a planning perspective, seismic activity is of a primary concern to any development or project within the Dominguez Watershed since earthquake activity can be expected to continue through the lifetime of any project undertaken today.

As shown in Figure 2.1-7, several faults are present within the boundaries of the Dominguez Watershed. These include the Newport-Inglewood, Palos Verdes, Charnock, Cabrillo, and Redondo Canyon faults. Although seismic activity in southern California is dominated by the well known San Andreas fault, any one of the regional faults shown is likely capable of generating a moderate to large earthquake.

The most critical step in evaluating fault activity is to determine whether a given fault is "active" in terms of producing a damaging earthquake. A fault is considered active if it is likely to undergo movement within a specified period of concern. Because faults can lie dormant for significant lengths of time before rupturing again, there is no applicable time span used to determine whether or not a fault is active. The seismic hazards that can potentially affect portions, if not all, of the Dominguez Watershed due to fault movement include ground shaking, liquefaction, landslides and tsunamis.

2.1.4.1 Ground Shaking

Detectable ground shaking in the Dominguez Watershed could be caused by any of the active or potentially active faults in southern California. Because most of the watershed area is underlain by an unstable sub-base of sandy soil, it is regarded as one of the most severe shock areas in the Los Angeles area. Many different factors control how ground motion interacts with structures. The California Department of Mines and Geology (CDMG) now the California Geological Survey (CGS) has identified several Earthquake Fault Zones within the watershed area, and a site-specific geological report would be required for any project within one mile of an Earthquake Fault Zone established by the CGS.

2.1.4.2 Liquefaction

Liquefaction is a process by which water-saturated granular soils transform from a solid to a liquid state because of a sudden shock or strain. Basic conditions necessary for liquefaction to take place are soil conditions conducive to liquefaction, saturation of these materials by water, and a source of shaking. The Newport-Inglewood Fault zone is a potential source of ground motion, and liquefaction could occur in the area where the groundwater table is high enough during an earthquake. Due to existing conditions in the watershed, particularly in the alluvial, former slough and existing harbor areas, there is the possibility that liquefaction could impact buildings and/or other structures in the event of an earthquake. Figure 2.1-7 graphically displays the potential areas of liquefaction in the watershed, which is centered around the harbors and extends inland along the path of the former slough existing area of the Ken Malloy Harbor Regional Park, and along Dominguez Channel inland to approximately the 91 Freeway.

2.1.4.3 Landslides

Landslides that result from seismic activity can potentially occur on unstable, moderate to steep slopes where ground motion causes loose soils and rocks to move downslope under the force of gravity. As shown in Figure 2.1-7, the areas within the Dominguez Watershed where landslide potential has been

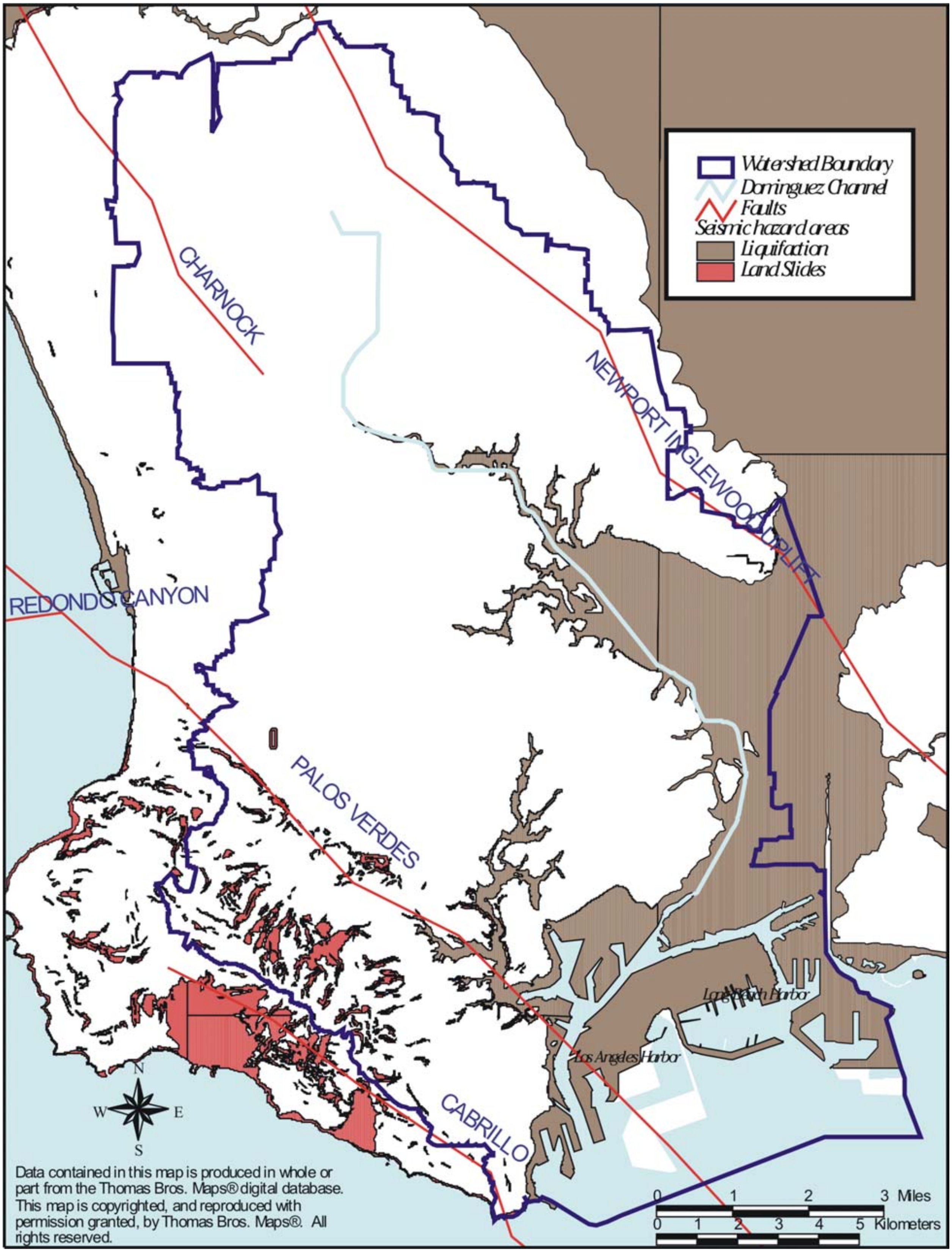


Figure 2.1-7. Major earthquake faults within the Dominguez Watershed.

designated mostly include the hills and canyons of the Palos Verdes Hills. The combination of ground shaking and the presence of water in the subsurface can also lead to landslides. Modifications to the natural environment such as slope cutting, landfills, installation of underground septic tanks, and lawn watering can increase the potential for landslides.

2.1.4.4 Tsunamis

A tsunami is a seismically induced sea wave. A vertical displacement of the sea floor caused by a fault rupture could potentially lead to a corresponding displacement of ocean water generating a long wave containing a large amount of energy. Depending on its size and force, such a wave could threaten Los Angeles and Long Beach Harbors infrastructure, mooring areas, and the low-lying land of the Dominguez Watershed adjacent to the harbors.

2.1.5 Summary of Physical Conditions

The Dominguez Watershed has a Mediterranean like climate with warm summers and mild winters. Rainy and dry seasons are fairly constant, with rain generally occurring from November through April. Exceptions to this generally are associated with El Niño, which can result in strong intensity storms with higher than average precipitation and high waves. The watershed is currently classified as a federal and state nonattainment area for ozone, carbon monoxide, and respirable particulates.

The Dominguez Watershed is of relatively low gradient with gently rolling plains between the Rosecrans and Dominguez Hills that rise to about 61 meters (200 feet) elevation in the northern and eastern portions of the watershed, and the Palos Verdes Hills that rise to an elevation of 451 meters (1,480 feet) near the coast. Abundant soil types in the watershed include Diablo Clay Loam, Ramona Loam, and Ramona Sandy Loam. With the exception of the clay soils, most of the watershed has soils with moderate to severe erosion potential, which can lead to sedimentation in water bodies. This is moderated by the low gradient of most of the watershed, which tends to favor slower runoff rates.

Contaminated soils occur at several sites within the Dominguez Watershed. Contaminants of particular concern include DDT, other pesticides, PAHs, PCBs, and metals (e.g., copper, lead, mercury). Contamination occurs in the Dominguez Channel, Machado Lake, and Los Angeles and Long Beach Harbors. The most contaminated site is located in the Consolidated Slip, which is where the Dominguez Channel empties into Los Angeles Harbor. EPA has designated two Superfund sites for cleanup in the watershed.

Other sites with varying degrees of contamination include brownfield sites. Numerous brownfield sites were identified within the watershed, and several potential brownfield sites occur within the Ports of Los Angeles and Long Beach. Remediation and redevelopment of brownfields may provide opportunities for restoration to open space.

Five earthquake faults underlie the boundaries of the Dominguez Watershed. These include the Newport-Inglewood, Palos Verdes, Charnock, Cabrillo, and Redondo Canyon faults. Any one of these regional faults has the potential to result in seismic hazards such as ground shaking, liquefaction, landslides, and tsunamis. Hazards from liquefaction are most associated with alluvial sandy soils such as occur around the harbor areas and extend further inland along Dominguez Channel and to Harbor Regional Park. Landslides induced by earthquakes are of greater risk along the Palos Verdes peninsula. Thus, the soil types of the watershed make it potentially one of the most severe seismic hazard areas in Los Angeles County.

2.2 Land Use and Development

Land use characteristics influence watershed health and the quality of life perceptions of people. In particular, the different types of land uses can have a substantial effect on water quality of rivers, streams, and the ocean when rainfall runoff washes from the land. Depending on whether the land has residential, commercial, industrial, or natural habitat, runoff may pick up and carry contaminants, debris, sediment, and/or trash to storm drains and receiving waters.

Land is valued based on utility, scarcity and desirability. Land development that generates income related to use of natural resources (e.g., oil refineries, shipping harbors) or sale of services (e.g., factories, shopping malls, housing) is highly valued. So too are transportation systems that enable people to easily move through the landscape. Convenience to shopping, schools, and parks; availability of water, sewers, utilities and public transportation; and absence of bad smells, noise, and blighted areas contribute to land values. In addition, the amount of open space for recreation and visual aesthetics are important. Real estate values generally are higher where the ratio of open space to development is high. Natural areas, parks, nature preserves, greenbelts, landscaped common areas, and bodies of water all contribute to a sense of land value and desirability.

Los Angeles County and cities within the watershed all strive to balance the economic benefits of land development with quality of life issues. Various codes and ordinances are used to guide land development to ensure safety, conserve natural areas, and contribute to the aesthetics and desirability of land values. Federal and state regulations also govern land development to protect public safety and natural resources.

Background information on regulatory requirements and different aspects of land use are discussed in this section. Natural and imported resources and public services also are described. Information was summarized based on available reports and search of internet websites for many of the jurisdictions and large service providers within the watershed. The following topics are addressed in this section.

- Regulatory requirements,
- Land use patterns,
- Transportation,
- Natural and imported resources,
- Public services and utilities, and
- Recreational resources.

2.2.1 Regulatory Requirements

There are numerous federal, state, and local regulations that govern land use activities and construction in the Dominguez Watershed. Many of these regulations pertain to land use, new development and redevelopment, stormwater runoff, and protection of water quality. The following section provides a summary of the key regulations. Federal and state regulations are described first. Local objectives based on the General Plans for the different jurisdictions are described at the end of this section.

2.2.1.1 Federal and State Regulations

Any project that proposes to fill or otherwise physically alter creeks, wetlands, or other waters requires a number of federal, state and, in some cases, local permits before it can proceed. In describing the following permits, it should be recognized that impacts to "waters of the United States" and impacts to "waters of the State" might differ, due to the differing laws and regulations that address these impacts.

The term "waters of the United States" means territorial seas; all waters used in interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide; wetlands; all other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds; and tributaries of waters to water bodies described above. The definition of the "waters of the United States" is currently being reviewed because of the 2001 court decision on the Solid Waste Agency of Northern Cook County (SWANNC) versus the U.S. Army Corps of Engineers. The SWANNC decision limits the scope of the Corps regulatory permitting program (Section 404) under the Clean Water Act (CWA) as applied to isolated waters. By narrowing the water and wetland areas subject to federal regulation, the decision also narrows the areas subject to CWA Section 401 programs that require State approval for federally permitted activities, and partially narrows the areas and activities subject to State Coastal Zone Management Act consistency review.

Waters of the State are defined as any surface water or groundwater, including saline waters, within the boundaries of the state. Examples include, but are not limited to, rivers, streams, lakes, bays, marshes, mudflats, unvegetated seasonally ponded areas, drainage swales, sloughs, wet meadows, natural ponds, vernal pools, diked baylands, seasonal wetlands, and riparian woodlands.

Federal Clean Water Act

The principal law that serves to protect the nation's waters is the Federal Water Pollution Control Act, which was originally enacted in 1948. This legislation, which today is more commonly referred to as the CWA, underwent significant revision when Congress, in response to the public's growing concern of widespread water pollution, passed the Federal Water Pollution Control Act Amendments of 1972.

The 1972 legislation established two fundamental, national goals: eliminate the discharge of pollutants into the nation's waters and achieve water quality that is both "fishable" and "swimmable." The 1972 amendments to the CWA also prohibited the discharge of any pollutant to waters of the United States from any point source (e.g., a discharge pipe) unless the discharge was authorized by a National Pollutant Discharge Elimination System (NPDES) permit. However, non-point source discharges (i.e., storm water or urban runoff) were not fully covered under the NPDES permit program until Congress amended the CWA in 1987.

Specific sections of the CWA concern different aspects of protecting waters and water quality.

- Section 303 requires states to establish and enforce water quality standards to protect and enhance beneficial water uses, including recreation and wildlife.
- Section 401 requires certification by the RWQCB that the permitted project complies with State Water Quality Standards, and would not cause concentrations of chemicals in the water column to exceed these standards.
- Section 402 prohibits the discharge of pollutants into waters of the United States from any point source without an NPDES permit.

- Section 404(b)(1) guidelines require that dredging and disposal activities should have no unacceptable adverse impacts. The U.S. Army Corps of Engineers (USACE) requires a permit for the dredging and disposal of materials within the waters of the United States.

Several industries within the watershed have NPDES permits that allow discharge to Dominguez Channel and/or the harbors. Port development and maintenance dredging within the harbors is governed by Section 401 and Section 404 requirements. These sections of the CWA are described in additional detail below.

NPDES Permit Program

Although this program initially focused on point-source discharges of municipal and industrial wastewater, results of the Nationwide Urban Runoff Program (NURP) identified contaminated storm water as one of the primary causes of water quality impairment. To regulate storm water (non-point source) discharges, EPA developed a two-phased NPDES permit program.

NPDES Permit Program – Phase I

In November 1990, under Phase I of its storm water program, the EPA published NPDES permit application requirements for municipal and industrial storm water discharges. These application requirements include the following:

Municipalities which own and operate separate storm drain systems serving populations of 100,000 or more, or which contribute significant pollutants to waters of the United States, must obtain municipal storm water NPDES permits.

A municipality must develop and implement a storm water management program to obtain a permit. The municipal storm water management program must address how to reduce pollutants in industrial storm water discharges and other discharges that are contributing a substantial pollutant load to their systems.

Facilities that are discharging storm water associated with industrial activity, including construction activities that disturb five or more acres, must acquire industrial storm water NPDES permit coverage.

NPDES Permit Program – Phase II

On August 7, 1995, EPA amended the NPDES permit application requirements in order to focus on Phase II storm water discharges, such as discharges caused by:

- Commercial, light industrial, and institutional activities;
- Construction activities under five acres; and
- Municipal storm drain systems serving populations under 100,000.

Similar to Phase I requirements, the NPDES Phase II permit program also requires the development and implementation of storm water management plans to reduce such discharges. Affected agencies must apply for a NPDES Phase II permit by March 2003.

401 Certification

Under Section 401 of the CWA any project that includes the construction or operation of facilities that may result in any discharge into navigable waters, shall provide the federal licensing or permitting agency a certification from the State. The certification is provided by the Regional Water Quality Control Board if the project will comply with water quality standards of the Clean Water Act, including beneficial uses, water quality objectives, and antidegradation policies applicable the water body. Projects that may require 401 Certification include, but are not limited to, navigational dredging; flood control channelization; levee construction; channel clearing; or fill of wetlands for land development. The regulations governing California's issuance of 401 certifications were updated in 2000, and are contained in Sections 3830 through 3869 of Title 23 of the California Code of Regulations.

404 Permit

Section 404 of the CWA establishes a program to regulate the discharge of dredged and fill material into waters of the United States, including wetlands. Activities in waters of the United States that are regulated under this program include dredging, fills for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports), and conversion of wetlands to uplands for farming and forestry. The basic premise of the program is that no discharge of dredged or fill material can he permitted if a practicable alternative exists that is less damaging to the aquatic environment or if the nation's waters would be significantly degraded.

Storm Water Discharge Permit Requirements

The Regional Boards implement the municipal storm water NPDES permit program. The State issues area-wide permits for urban areas that are considerable sources of pollutants or contribute to water quality standard violations. Regardless of population, the area-wide permits cover all municipalities within the defined urban area. Therefore, the cities within the Dominguez Watershed are included in the regional Los Angeles County NPDES permit described below.

Los Angeles County Municipal Permit

In 2001, the Regional Board issued a municipal storm water permit to the County of Los Angeles and the incorporated cities within Los Angeles County (except Long Beach), collectively referred to as Co-permittees. The Co-permittees developed the following six “Model Programs for Stormwater Management within Los Angeles County” to guide implementation activities under the permit.

Elimination of Illicit Connections and Discharges – which requires the identification and elimination of all non-permitted discharges to the storm drain system and facilitation of the general public's ability to report illicit connections and discharges.

Development Planning and Construction – which is designed to ensure that storm water management considerations are integrated into planning, permitting and construction of development projects.

Public Agency Activities – which requires the permittees to develop methods to reduce the impact of public agency activities on storm water quality including

Public Information and Involvement – which requires the providing materials for the general public and targeted audiences that convey information about storm water pollution and what can be done to help solve the problem, develop an educational, compliance assistance program for industries and businesses that are potential sources of urban runoff pollutants, and develop a five-year countywide storm water public education strategy.

Monitoring – which requires the development of a storm water quality monitoring program to track water quality status and trends, identify watershed-specific pollutants of concern, improve understanding of the relationship between land uses and pollutant loads, identify sources of pollutants, evaluate significant storm water quality problems, evaluate the effectiveness of storm water management programs, and increase knowledge about the impacts of runoff on receiving waters.

Program Reporting and Evaluation – which requires the preparation of an annual report on the results of the monitoring program.

Industrial Permits
Industrial site storm water management is governed by the State Board under Water Quality Order 97-03-DWQ / NPDES General Permit No. CAS000001. These regulations prohibit discharges of storm water to waters of the United States, unless in compliance with a NPDES permit, from a broad range of industrial activities, including mining, manufacturing, disposal, recycling, and transportation.

To receive coverage under and comply with the State General Industrial Activities Storm water Permit (General Permit), the owner or operator of an industrial facility must:

- Send the State Board an Notice of Intent (NOI) to comply with the General Permit;
- Prepare and implement a storm water pollution prevention plan (SWPPP) that will:
    - Discuss characteristics of the site and specific pollutants which could impact storm water quality;
    - Describe best management practices (BMPs) that the owner or operator will implement to control sources of storm water pollution to the maximum extent practicable;
    - Verify that any illicit connections to storm drains have been eradicated;
    - Develop and execute a Monitoring Plan to assess the effectiveness of BMPs through visual inspection of storm drains during wet and dry weather and storm sampling;
- Maintain a copy of the SWPPP and Monitoring Plan onsite such that it is available for regulatory agency staff and public inspection;
- Prepare and submit an annual report with monitoring results and a certificate of compliance by July 1st annually; and
- Pay an annual fee of $500. If the facility discharges to a storm drain system that is regulated by a municipal NPDES storm water permit, the annual fee is $250.

An industrial facility has the option to request an individual, site-specific NPDES permit instead of the General Permit. However, Regional Boards typically only consider adopting an individual permit when the facility has exceptional characteristics or poses a considerable threat to storm water.

General Construction Storm Water Permit
Construction site storm water management is governed by the State Board under Water Quality Order 99-08-DWQ / NPDES General Permit No. CAS000002. These regulations prohibit discharges of storm water to waters of the United States from construction projects that encompass one or more acres of soil disturbance unless the discharge is in compliance with an NPDES permit.

The California General Permit (enforced by the nine Regional Boards) requires all dischargers where construction activity disturbs one acre or more to:

- Develop and implement a SWPPP that specifies BMPs that will prevent all construction pollutants from contacting storm water and with the intent of keeping all products of erosion from moving off site into receiving waters;

- Eliminate or reduce non-storm water discharges to storm sewer systems and other waters of the nation; and
- Perform inspections of all BMPs.

Los Angeles County requires an Erosion Control Plan (ECP) for all developments as part of the SWPP; if development is less than 1 acre, only an ECP is prepared.

Construction activity subject to this General Permit includes clearing, grading, disturbances to the ground such as stockpiling, or excavation that results in soil disturbances of at least one acre of total land area. Construction activity that disturbs less than one acre of soil is subject to this General Permit if the construction activity is part of a larger common development plan (encompassing one or more acres of disturbed soil) or if the construction causes significant impairment to local water quality. Construction activity does not include routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility, nor does it include emergency construction activities required to protect public health and safety.

A construction project that involves a dredge and/or fill discharge to any jurisdictional surface water (e.g., wetland, channel, pond, or marine water) also needs a CWA Section 404 permit from the U.S. Army Corps of Engineers and a CWA Section 401 Water Quality Certification from the Regional Board and State Board. Storm water discharges from dredge spoil placement, which occur outside of Corps jurisdiction (upland sites), and are part of construction activity that disturbs one or more acres of land are covered by this General Permit.

It is the responsibility of the landowner to obtain coverage under this General Permit <u>prior</u> to commencement of construction activities. To obtain coverage, the landowner must file a NOI with a vicinity map and the appropriate fee with the State Board. Coverage under this permit does not occur until the applicant develops an adequate SWPPP for the project. Section A of the General Permit outlines the required contents of a SWPPP. For proposed construction activity on easements or on nearby property by agreement or permission, the entity responsible for the construction activity is required to file an NOI and filing fee and is responsible for development of the SWPPP, all of which must occur prior to commencement of construction activities.

This General Permit does not apply to storm water discharges from:

- Tribal Lands;
- The Lake Tahoe Hydrologic Unit;
- Construction by municipal entities with a population under 100,000;
- Construction under one acre, unless part of a larger common plan of development or sale;
- Projects covered by an individual NPDES Permit for storm water discharges associated with construction activity; and
- Landfill construction that is subject to the general industrial permit.

Rivers and Harbors Act of 1899

Section 10 of the Rivers and Harbors Act prohibits the unauthorized obstruction or alteration of any navigable waters of the United States, and authorizes the Corps to regulate all activities that affect the course, capacity, or coordination of waters of the United States. The Corps processes Section 10 permits simultaneously with 404 permits because of their similar requirements.

Coastal Zone Management Act of 1972 (CZMA)

The goal of the Coastal Zone Management Act (CZMA) is to encourage states to preserve, protect, develop and, where possible, restore and enhance valuable natural coastal resources. Participation by states is voluntary. The State of California has enacted the federally approved California Coastal Act.

Section 1456 of the CZMA requires that any federal action inside or outside of the coastal zone that affects any land or water use or natural resources of the coastal zone shall be consistent, to the maximum extent practicable, with the enforceable policies of approved state management programs. It states that no federal license or permit may be granted without giving the State the opportunity to concur that the project is consistent with the state's coastal policies. The regulations outline the consistency procedures.

California Coastal Act of 1976

The primary mission of the California Coastal Commission (CCC) is to plan for and regulate land and water uses in the coastal zone consistent with the policies of the Coastal Act. The Coastal Act was created to manage the conservation and development of coastal resources. The program is shared by the CCC and local jurisdictions through the Local Coastal Program (LCP) where the local government assumes most permitting and planning responsibilities. The CCC retains some jurisdiction over development in the coastal zone.

2.2.1.3 Pertinent City Land Use Objectives

Table 2.2-1 provides a summary of goals, objectives, and/or relevant characteristics associated with land use, open space/recreation, and conservation as specified in the relevant sections of General Plans of cities within the Dominguez Watershed. Many municipalities will have additional policies (codes, ordinances) that encourage watershed management and restoration activities in the Dominguez Watershed. Local land planning objectives and regulations provide relevant language that demonstrates the need for conservation, enhancement, and restoration of open space.

Table 2.2-1. Sections of General Plan policies relevant to watershed management in the Dominguez Watershed.

City or Planning Area	Land Use	Open Space/ Recreation	Conservation
Carson	Allow each land use sufficient area to develop to fullest extent indicated by the economy and general welfare. Separate non-conforming uses.	Protect open areas. No links exist between open space areas. Clean up vacant land and blighted areas. Promote landscaping along Dominguez Channel. Provide additional parks especially in areas with greatest need.	Regulate development to control loads on treatment facilities.
El Segundo	41.7 hectares (103 acres) of vacant land in non-residential areas. Encourage shift from manufacturing and heavy industry to commercial.	Mostly commercial and industrial area in watershed. Increase quantity of plant material to increase water percolation. Private owned recreational facilities in commercial areas.	Protect groundwater from contamination. Minimize surface runoff and allow replenishment of soil moisture.
Gardena	Mixed land uses and minimal buffer areas Promote a pedestrian oriented environment and balanced development.	Minimal landscaping and parkway trees Reestablish and preserve City's agrarian history. Restore Gardena Willows (remnant tidal wetlands area). Establish small community centers and large parks. Acquire land for parks and recreational open space.	Maintain an independent source of water.
Hawthorne	Stimulate, attract and enhance commercial development. Conserve water and utilize reclaimed water where feasible. Promote conservation, recycling and public education.	Undeveloped land in the southwest corner of the city, which is currently owned by Caltrans and Southern California Edison. Develop and maintain recreational parks and open spaces. Provide recreational variety.	Potential to recharge Gage Aquifer in West Basin. Use reclaimed water where feasible.
Harbor Gateway (Los Angeles)	Designated as a center for commerce and industry. Cumulative effects of development exceed infrastructure capacities. Lack of transitions in land use.	Lack open space and recreational areas. Propose bikeways along power line, flood control and vacated railroad rights of way. Utilize deeded lots, fragments of public land and unneeded street areas for open space.	N/A

Table 2.2-1. (Continued).

City or Planning Area	Land Use	Open Space/ Recreation	Conservation
Inglewood	All city parks utilize recycled water.	Potential for open space where faults traverse unbuilt land. Deficient of open space and recreational areas. Constructing additional parks will entail removing residences or other developed land.	Reduce water demand and utilize reclaimed water. Promote conservation, protection and effective use of natural resources through local and cooperative efforts.
Lawndale	"A city of renters." Abandoned but not depleted oil field. Develop a system to utilize storm water for landscaping needs.	3.7 hectares (9.1 acres) of vacant, privately owned land. Pursue and acquire additional parkland. Pursue discussions with railroad companies to acquire right of way for linear parks. Develop a trail plan.	Protect limited groundwater supply. Conserve domestic water.
Lomita	Promote more efficient use of underutilized properties.	Expand recreational open space. Sensitive habitat located near City Hall (spadefoot toad). Palos Verdes blue butterfly located at US Navy fuel depot. Improve and increase size, acreage and accessibility of local parks.	1360 acre-feet of unused groundwater allotment awaiting treatment facility. Preserve resources and amenities that enhance City's living and working environment. Conservation of natural resources.
Long Beach	Emphasize managed growth. Focus on downtown redevelopment and revitalization. Reduce home-to-work travel. Encourage rebuilding of underutilized/ deteriorated structures. Emphasizes protection of beaches and oceanside bluffs. Encourages building of new playgrounds and parks.	Identify and preserve sites of outstanding scenic, historic, and cultural significance, or recreational potential. Assure that waters of San Pedro Bay, Alamitos Bay, Colorado Lagoon are maintained at the highest quality to enhance their recreational and commercial utilization.	Provide protective controls for lands supporting unique vegetation, wildlife species. Revitalize and enhance area where inadequate conservation measure occurred in past. Preserve beach for public use. Conserve natural resources through wise management and well planned utilization of water, vegetation, wildlife, minerals.
Los Angeles	Reduce the amount of waste released to water. Damage to the ecology of bays has a direct effect on the environment and economy of the city. Encourage cleanup and development of brownfields.	Endangered California least tern nests in Harbor area. Protect and promote restoration of native species and habitats. Protect and restore Ocean fisheries. Link existing parklands.	N/A

Table 2.2-1. (Continued).

City or Planning Area	Land Use	Open Space/ Recreation	Conservation
Manhattan Beach	Residents do not want an increase in density. Area in watershed contains a mall, hotels, office space, aerospace industry and residential.	Required landscaping and setbacks. Maintain open space for flood control. Provide parks at 2 hectares (5 acres) per 1000 residents.	Promote water conservation using drought resistant/native plants and recycled water.
Palos Verdes Estates	Low density land use. Emphasize natural beauty of hills and canyons and diminish impact of man-made things.	Reserve undeveloped parklands for passive recreation.	Participate in water management programs for water conservation and flood control. Required sewers. Encourage proper planting of parkland areas to improve habitat for wildlife. Conserve the natural canyons and hillsides for drainage control.
Rancho Palos Verdes	Low density land use and large open space areas. Unusual topography, high landslide potential.	Any re-development requires planting native vegetation. Preserve natural drainage courses. Existing and adopted bike plan has not been implemented. Equestrian.	Encourage use of alternate water sources. Cooperate regionally in water management. Encourage investigation of controlling pollution in runoff.
Redondo Beach	Long standing “nuisance” water from domestic uses along streets in certain areas. High permeability of soil. Provide land uses that are regionally attractive and contribute revenue to the City.	Insufficient space for bike trails. Decreasing areas of private open space. Hopkins Wilderness Park located in watershed.	West Coast salt water intrusion barrier. Encourage water conservation practices. Examine feasibility of utilizing alternative means of water resources and production for use (desalination).
Rolling Hills	Minimal land available for development. Rural residential character. Accommodate development that is sensitive to the natural environment. Potential leaking septic systems during rain No flooding concerns.	Preserve open space and native character. Maintain and improve hiking and riding trails.	Conserve and enhance natural resources. Low permeability soils.

Table 2.2-1. (Continued).

City or Planning Area	Land Use	Open Space/ Recreation	Conservation
Rolling Hills Estates	City is almost completely developed. Low density residential character. Potential for re-development of Chandler Quarry, Northrop and former landfills. Approximately 15 percent of city on septic tanks.	Open spaces consist of steep slopes and serve as natural drainage courses and plant/animal habitats. Privately owned and undeveloped open space. Abundance of parks and open space.	Conserve natural resources and maintain balanced ecology.
San Pedro (Los Angeles)	Maintain low density character of single family areas. Two current community redevelopment agencies.	Lack of usable open space in multiple family residential projects. More public recreational water access is needed, (e.g., a second boat launch). Provide recreational facilities along public right of way, (i.e., flood control facilities and utility easements).	Protect, enhance and restore the overall quality of the Coastal Zone environment and its natural and man-made resources.
Torrance	"Balanced city." Preserve areas of historic and cultural significance.	Preserve wildlife habitat areas. Tree coverage throughout city. Preserve open space and provide adequate space for recreation. Acquire lands for parks. Acquire Railroad ROW for trails.	Encourage use of alternate water sources and water conservation. Water desalinization plant treating brackish groundwater.
Wilmington (Los Angeles)	Preserve and enhance the varied and distinct uses (residential, commercial, industrial). Long-standing desire to have a marine-oriented commercial area develop at the foot of Avalon Blvd (near Bannings Landing). Lack of transition areas between land uses.	Open space and recreational amenities of the community are concentrated in Harbor Park and Banning Park. Need for more neighborhood parks. Preserve unique wildlife habitats and ecologically important areas within parks and recreation areas in a natural state, for the protection of plant and animal species, and for public enjoyment, health and safety.	N/A

N/A = not available

2.2.2 Land Use Patterns

The Dominguez Watershed consists of the Dominguez Channel, its tributaries, the open water of Los Angeles and Long Beach Harbors, and the land that drains to them, including the Cities of Carson, El Segundo, Gardena, Hawthorne, Inglewood, Lawndale, Lomita, Long Beach, Los Angeles, Manhattan Beach, Palos Verdes Estates, Rancho Palos Verdes, Redondo Beach, Rolling Hills, Rolling Hills Estates, Torrance, and portions of Los Angeles County. The area and percent of the total watershed area by City and County are shown below in Table 2.2-2.

Table 2.2-2. Contributing land and water areas by jurisdiction within the Dominguez Watershed.

Jurisdiction	Area (km^2)	Area (mi^2)	Percent of Total
Carson	48.4	18.7	14.0
Compton	2.0	0.8	0.6
El Segundo	5.3	2.0	1.5
Gardena	15.2	5.9	4.4
Hawthorne	15.6	6.0	4.5
Inglewood	15.7	6.1	4.6
Lawndale	5.1	2.0	1.5
Lomita	5.0	1.9	1.4
Long Beach	13.5	5.2	3.9
Los Angeles	77.6	30.0	22.5
Manhattan Beach	1.5	0.6	0.4
Palos Verdes Estates	1.0	0.4	0.3
Rancho Palos Verdes	10.6	4.1	3.1
Redondo Beach	5.1	2.0	1.5
Rolling Hills Estates	8.1	3.1	2.3
Rolling Hills	6.0	2.3	1.7
Torrance	44.5	17.2	12.9
Unincorporated	33.0	12.7	9.6
Harbor Waters	32.9	12.7	9.5
TOTAL	345	133.3	100

The Dominguez Watershed covers a total of 345 square kilometers (133 square miles). The cities with the largest amount of land in the watershed are Los Angeles (22 percent), Carson (14 percent), and Torrance (13 percent). These communities are dominated by high density and multi-family residential land use types, with a fair amount of active redevelopment. The watershed is also home to several smaller, upscale communities, including Palos Verdes Estates, Rancho Palos Verdes, Rolling Hills, and Rolling Hills Estates, which are characterized by low density residential and equestrian land uses (refer to Table 2.2-1). The Cities of Los Angeles and Long Beach and Ports within these cities have local jurisdiction over the harbors within the watershed. The harbors are considered waters of the State and United States, therefore, port development must comply with state and federal regulations.

Land use has been classified in two different ways, using 34 specific land use categories (Figure 2.2-1,Table 2.2-3) and 8 generalized land use categories (Figure 2.2-2, Table 2.2-4).

Table 2.2-3. Land use within the Dominguez Watershed.

Land Use	Area (km^2)	Area (mi^2)	Percent of Total Land	Percent of Total Watershed
Education	10.5	4.1	3.4	3.1
High Density Single Family Residential	97.4	37.6	31.2	28.5
Mobile Homes	2.9	1.1	0.9	0.9
Light Industrial	37.4	14.4	12.0	10.9
Harbor Facilities	22.2	8.6	7.1	6.5
Heavy Industrial	19.4	7.5	6.2	5.7
Utility Facilities	5.0	1.9	1.6	1.5
Natural Resources Extract	1.9	0.7	0.6	0.6
Under Construction	0.5	0.2	0.2	0.1
Maintenance Yards	0.4	0.2	0.1	0.1
Communication	0.1	0.02	0.02	0.02
Multi family residential	16.6	6.4	5.3	4.9
Mixed Residential	12.1	4.7	3.9	3.5
Retail/Commercial	17.9	6.9	5.7	5.2
General Office	5.4	2.1	1.7	1.6
Other Commercial	3.8	1.5	1.2	1.1
Institutional	3.9	1.5	1.3	1.2
Military	2.5	1.0	0.8	0.7
Marina Facilities	0.9	0.3	0.3	0.3
Mixed Commercial/Industrial	0.5	0.2	0.2	0.1
Mixed Urban	0.2	0.1	0.1	0.1
Other Facilities	0.2	0.1	0.1	0.1
Transportation	15.9	6.2	5.4	4.7
Mixed Transportation/Utilities	0.8	0.3	0.3	0.2
Open Space/Recreation	7.5	2.9	2.4	2.2
Vacant	7.3	2.8	2.4	2.1
Urban Vacant	7.1	2.7	2.3	2.1
Low Density Single Family Residential	5.4	2.1	1.7	1.6
Golf Courses	3.1	1.2	1.0	0.9
Nurseries	2.8	1.1	0.9	0.8
Agriculture	0.5	0.2	0.2	0.2
Floodways	0.3	0.1	0.1	0.1
Animal Husbandry	0.2	0.1	0.1	0.1
TOTAL LAND	312.3	120.6		90.5
HARBOR WATERS	32.9	12.7		9.5
TOTAL	345	133.3		100

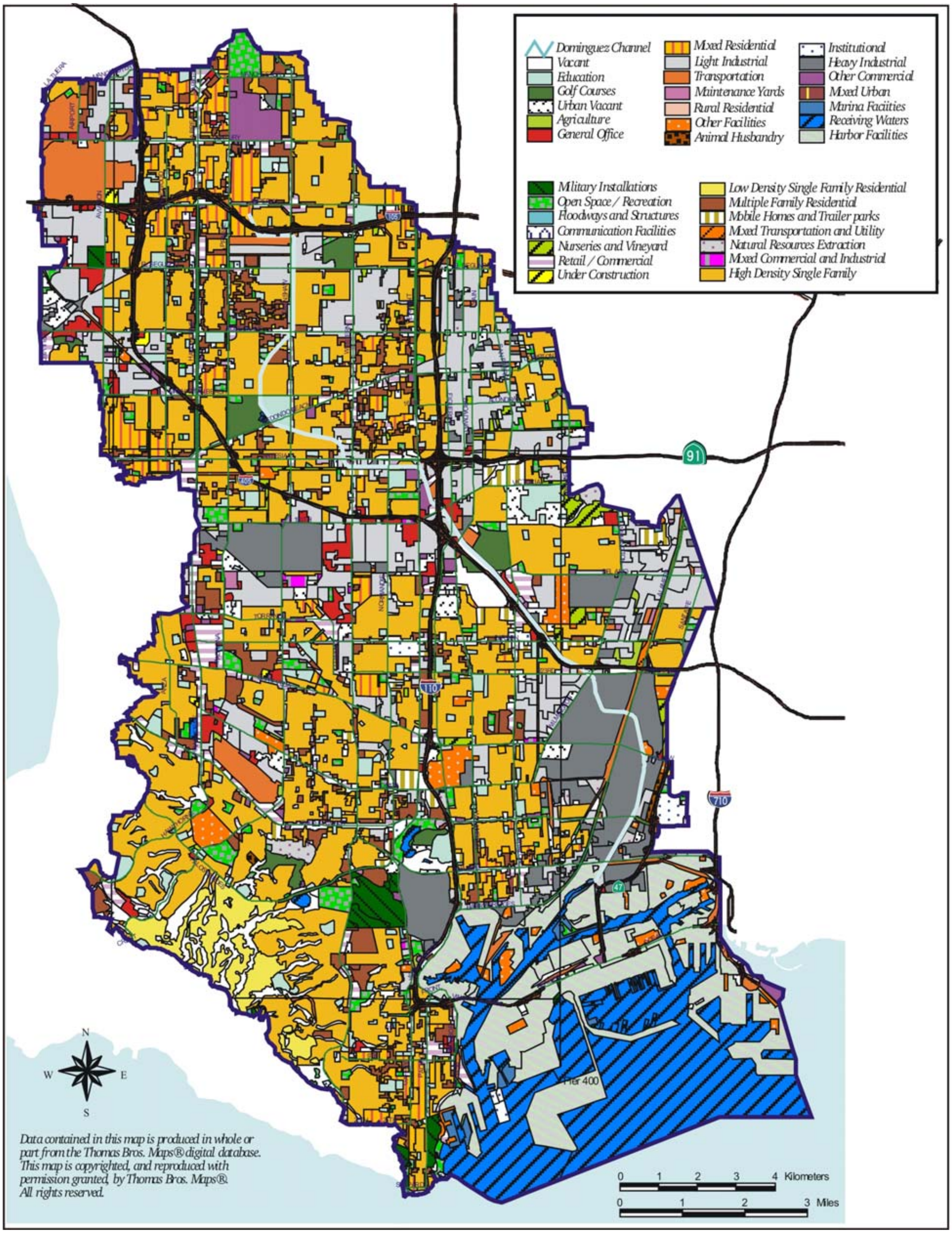
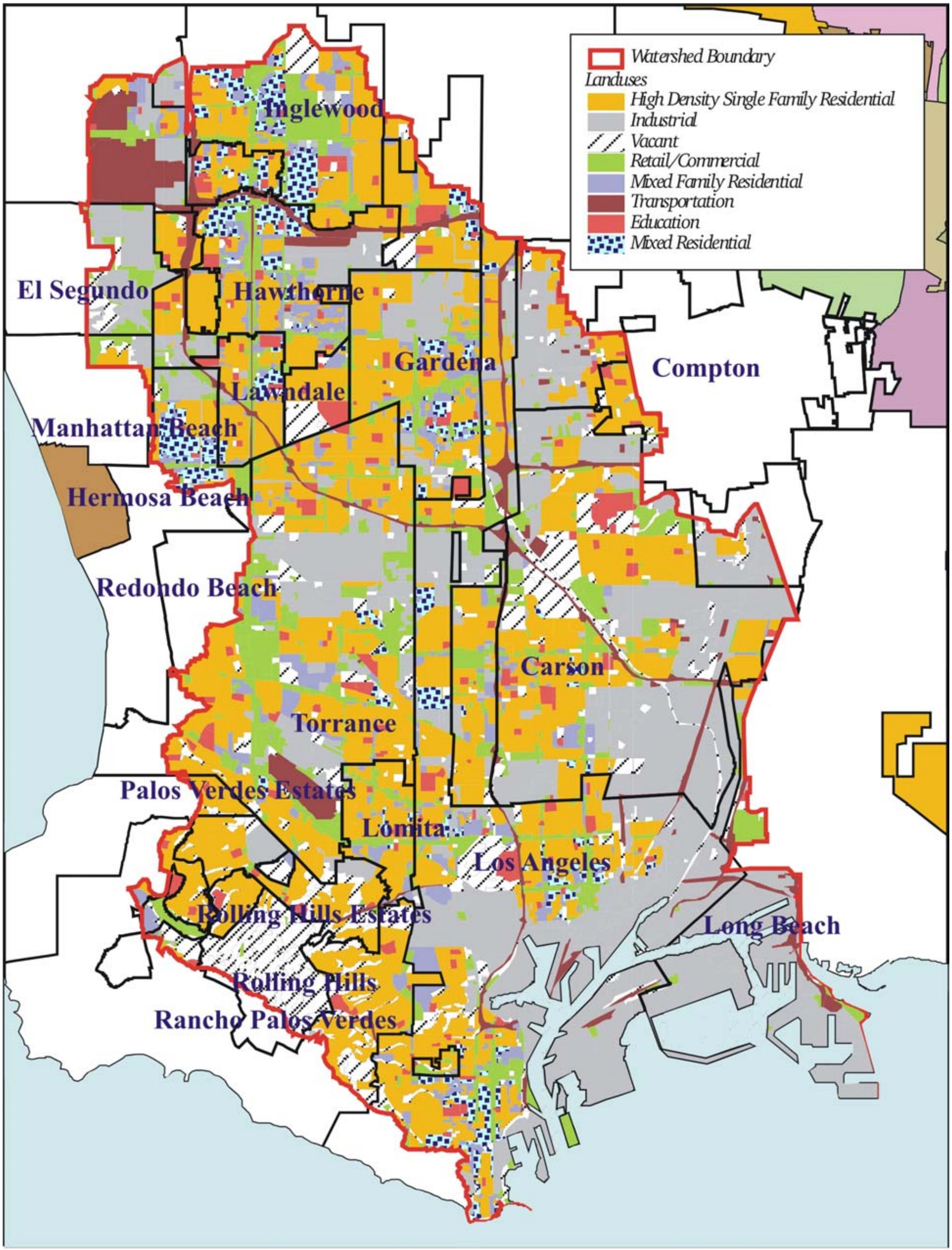


Figure 2.2-1. Land use within the Dominguez Watershed.



Note: These categories were used in the LADPW pollutant loading model. (See Section 2.3)

Figure 2.2-2. Summary land use categories within the Dominguez Watershed.

Table 2.2-4. Summary land use categories within the Dominguez Watershed.

Land Use	Area (km^2)	Area (mi^2)	Percent of Total
Education	10.5	4.1	3.1
High Density Single Family Residential	100.3	38.7	29.1
Multi-Family Residential	16.6	6.4	4.8
Mixed Residential	12.1	4.7	3.5
Industrial	86.8	33.5	25.2
Retail/Commercial	35.5	13.7	10.3
Transportation	16.7	6.5	4.8
Vacant	34.1	13.2	9.9
Harbor Waters	32.9	12.7	9.5
TOTAL	345	133	100

The watershed is a highly developed, urbanized area of southern Los Angeles County. Eighty-one percent of the entire 345 square kilometer (133 square mile) watershed is developed. The dominant land use types in the watershed are residential (38 percent) and industrial (25 percent). Transportation covers 5 percent of the land, and commercial and educational facilities account for 13 percent of land use. Approximately 10 percent of the watershed has predominantly vacant land. However, vacant land in the summary land category included, in addition to vacant land, those land use types that have substantial open space (e.g., open space/recreation, low density residential, golf courses, agriculture, nurseries). Approximately 9.5 percent of the watershed is covered with waters of the harbors. If land alone is considered, 93 percent of it is developed and 7 percent is associated with vacant land and open space/recreational use (Table 2.2-3).

The Port of Los Angeles consists of 3,035 hectares (7,500 acres) with 29 major cargo facilities, roadways, rail yards, shipping channels, and open water (Figure 2.2-3). The Port of Long Beach, which straddles the Dominguez and Los Angeles River Watersheds, has 3,082 hectares (7,616 acres) within the Dominguez Watershed with 80 cargo berths, 8 container terminals, roadways, rail yards, shipping channels, and open water (Figure 2.2-3). The Port's cargo terminals handle automobiles, containers, dry bulk products, and liquid bulk products. Facilities of both ports combined handle in excess of nine million units of cargo containers annually. Considered individually the Ports of Long Beach and Los Angeles are among the world's busiest seaports. Together the harbor-complex represents the third busiest port in the world (http://polb.com/html/1_about/overview.html, accessed February 2003).

For the purpose of this report, the Dominguez Watershed is comprised of five subwatersheds (see Section 2.3), and land use for each of the subwatersheds is given in Table 2.2-5.

Table 2.2-5. Summary land use categories by subwatershed within the Dominguez Watershed.

Land Use	Area (km^2)	Area (mi^2)	Percent of Sub-Watershed	Percent of Total Watershed
Upper Channel Subwatershed				
Education	4.3	1.6	4.4	1.3
High Density Single Family Residential	35.1	13.5	36.1	10.3
Light Industrial	14.5	5.6	14.9	4.2
Multi-Family Residential	8.1	3.1	8.3	2.4
Mixed Residential	7.9	3.1	8.2	2.3
Retail/Commercial	13.0	5.0	13.4	3.8
Transportation	8.3	3.2	8.6	2.4
Vacant	6.0	2.3	6.2	1.8
TOTAL	97.2	37.5	100	28.4

Table 2.2-5. (Continued).

Land Use	Area (km^2)	Area (mi^2)	Percent of Sub-Watershed	Percent of Total Watershed
Lower Channel Subwatershed				
Education	2.8	1.1	3.1	0.8
High Density Single Family Residential	22.8	8.8	25.7	6.7
Light Industrial	37.6	14.5	42.4	11.0
Multi-Family Residential	2.0	0.8	2.3	0.6
Mixed Residential	0.8	0.3	0.9	0.2
Retail/Commercial	8.3	3.2	9.4	2.44
Transportation	4.6	1.8	5.2	1.4
Vacant	8.0	3.8	11.2	2.9
TOTAL	88.8	34.3	100	26.0
Retention Basins Subwatershed				
Education	0.5	0.2	4.3	0.2
High Density Single Family Residential	5.9	2.3	46.6	1.7
Light Industrial	0.9	0.3	6.8	0.3
Multi-Family Residential	1.2	0.5	9.7	0.4
Mixed Residential	0.1	0.0	0.6	0.0
Retail/Commercial	2.8	1.1	22.4	0.8
Transportation	0.5	0.2	3.7	0.1
Vacant	0.8	0.3	6.0	0.2
TOTAL	12.7	4.9	100	4.0
Machado Lake Subwatershed				
Education	2.02	0.8	4.0	0.6
High Density Single Family Residential	23.0	8.9	45.5	6.7
Light Industrial	5.4	2.1	10.7	1.6
Multi-Family Residential	3.0	1.2	5.9	0.9
Mixed Residential	1.1	0.4	2.1	0.3
Retail/Commercial	5.3	2.0	10.5	1.5
Transportation	1.3	0.5	2.6	0.4
Vacant	9.5	3.7	18.7	2.8
TOTAL	50.6	19.5	100	14.8
Harbors Subwatershed				
Education	0.9	0.4	1.0	0.3
High Density Single Family Residential	13.6	5.2	14.3	3.9
Light Industrial	28.3	10.9	29.8	8.2
Multi-Family Residential	2.3	0.9	2.4	0.7
Mixed Residential	2.2	0.9	2.4	0.7
Retail/Commercial	4.8	1.9	5.1	1.4
Transportation	2.0	0.8	2.1	0.6
Vacant	7.9	3.1	8.3	2.3
Harbor Waters	32.9	12.7	34.6	9.5
TOTAL	95.0	36.7	100	27.6

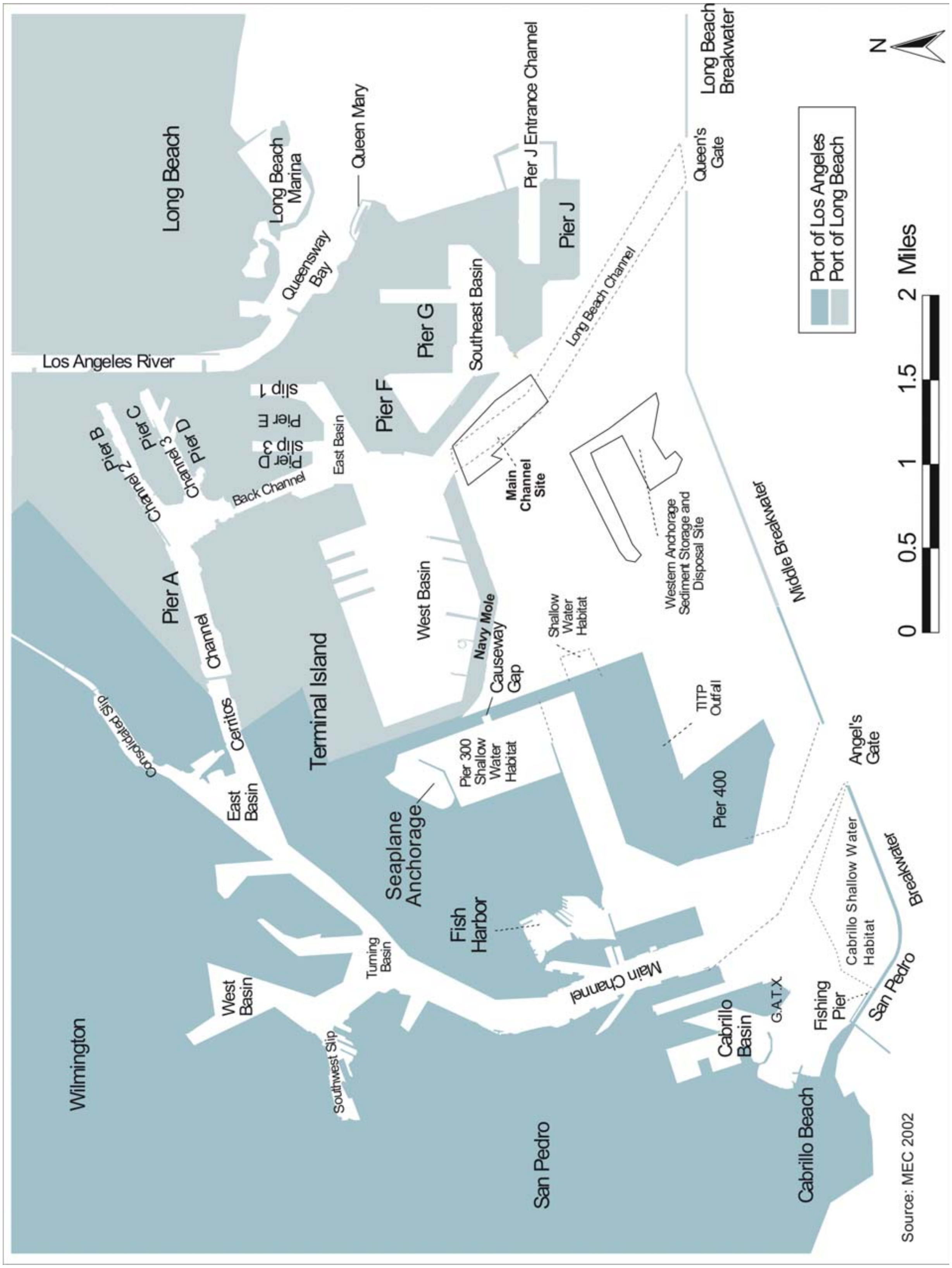


Figure 2.2-3. Map identifying different areas and features in Long Beach and Los Angeles Harbors.

The Upper Channel, Lower Channel, and Harbors Subwatersheds each comprise over 25 percent of the watershed. The Machado Lake Subwatershed represents approximately 15 percent, and the Retention Basins Subwatershed accounts for only 4 percent of the watershed. The Upper Channel Subwatershed is dominated by high-density residential land use. High density residential is the dominant land use in the Retention Basins and Machado Lake Subwatersheds. Light industrial followed by high density residential represent most of the land use in the Lower Channel Subwatershed. The Harbors Subwatershed is dominated by light industrial and open water land uses. The Lower Channel and Harbors Subwatersheds have had a long history of industrial uses, notably oil refining and commercial shipping.

Several of the jurisdictions responded to a questionnaire, and indicated that new development or redevelopment were planned in the watershed (Table 2.2-6). Most of the jurisdictions use checklists to assist with review of planned developments for compliance with storm water permit requirements. Several of the jurisdictions have guidelines in their General Plans that require setbacks, buffers, and other active measures to conserve open space; however, for other jurisdictions, such guidance is minimal.

Table 2.2-6. Response to questionnaire regarding land use planning.

Jurisdiction	Planned New Development	Use of Plan Review Checklists for Compliance	Mechanisms to Conserve Open Space
Carson	Yes	Yes	NA (minimal guidance in General Plan, see Table 2.2-1)
El Segundo			NA (Minimal guidance in General Plan, see Table 2.2-1)
Gardena	Yes	No, but could be helpful	Residential development standards require minimum of private and common useable open space (goals in General Plan – see Table 2.2-1)
Hawthorne	Yes	Yes	Need (goals in General Plan, see table 2.2-1)
Inglewood	Yes, residential, commercial	Yes	None (goals in General Plan , see Table 2.2-1)
Lawndale			Need (minimal guidance in General Plan, see Table 2.2-1)
Lomita	No	Yes	None (goals in General Plan, see Table 2.2-1)
Long Beach	No	Yes	NA
Los Angeles	Yes	Yes	Acquire property for open space (General Plans of communities, see Table 2.2-1)
Manhattan Beach	Yes, public facility and commercial development	No, but could be helpful	NA (Required in General Plan, see Table 2.2-1)
Palos Verdes Estates	No	Yes	NA (Required in General Plan – see Table 2.2-1)
Rancho Palos Verdes			NA (Required in General Plan – see Table 2.2-1)
Redondo Beach			NA (Minimal guidance in General Plan, see Table 2.2-1)
Rolling Hills Estates	NA	Yes	NA (Required in General Plan – see Table 2.2-1)
Rolling Hills			NA (Required in General Plan – see Table 2.2-1)
Torrance	Yes, residential, commercial development	Yes	Buffer/open space provided on case by case basis when reviewing redevelopment projects (goals in General Plan – see Table 2.2-1)
Los Angeles County	No	Yes	Land use overlay of Sensitive Ecological Areas; bike and equestrian easements encouraged, pocket parks encouraged, passive recreation along streams, basins, rivers encouraged.
Port of Long Beach	Yes terminal construction, new bridge, remediation	Yes	NA
Port of Los Angeles			Not Applicable

NA = question not answered; if a jurisdiction did not return the questionnaire, the response was left blank.
Note: Information added to the table that was not part of the response to the questionnaire is given in parentheses.

2.2.3 Transportation

Because the Dominguez Watershed is highly developed, it is well-served by major transportation systems (Figure 2.2-4). These include an extensive system of streets, major highways, and freeways; rail service; three airports; and public transportation.

2.2.3.1 Highways and Major Arterials

The Dominguez Watershed is served by numerous major interstate highways and state routes. Interstate highways include the Harbor Freeway (I-110), Long Beach Freeway (I-710), San Diego Freeway (I-405), and Century Freeway (I-105). The 110 and 710 Freeways are north-south highways that extend from the port area to downtown Los Angeles. They each have six lanes in the vicinity of the harbor and widen to eight lanes to the north. The 405 is an eight-lane freeway that runs roughly parallel to the coast, and the I-105 runs east and west. State routes include Pacific Coast Highway (SR-1), the Terminal Island Freeway (SR-47), SR-19, SR-42, SR-91, SR-107, and SR-213. Representative average daily traffic volumes for the 110 and 710 Freeways are provided in Table 2.2-7.

Table 2.2-7. Average daily traffic volumes for selected locations in the Dominguez Watershed.

Roadway/Location	Average Daily Traffic (cars per day)
Harbor Freeway (I-110)	
North of Gaffey Street	64,000
At Channel Street	76,000
At Anaheim Street	98,000
At Sepulveda Blvd.	162,000
At San Diego Freeway	218,000
Long Beach Freeway (I-710)	
At Pacific Coast Highway	113,000
At Willow Street	132,000
At San Diego Freeway	147,000

Source: LAHD 1997

2.2.3.2 Public Transportation

Los Angeles County Metropolitan Transportation Authority

The communities within the Dominguez Watershed, known as "South Bay", are served by the Los Angeles County Metropolitan Transportation Authority or MTA. Within this region the MTA offers transportation through the MTA bus lines and the Metro Rail. The Metro Rail system joins the Metrolink commuter line at Union Station in downtown Los Angeles where the tracks are shared by Amtrak and other rail freight lines. Two of Metro Rail system's lines serve the gateway communities. The Metro Blue line serves the area between Long Beach and downtown Los Angeles and the Metro Green line serves the communities between Redondo Beach and Norwalk. Buses and shuttles provide connections throughout the metropolitan area.

Average ridership for the MTA bus lines in 2002 was 1,184,071 people per week with ridership declining somewhat from the previous two years. The number of riders during the fiscal year totaled 125,276,211. The Metro Blue Line rail service had an average of 128,327 riders per week declining somewhat from the number of riders the previous year but up from the year 2000 when there was a transit strike. The total number of riders for the Metro Blue Line was 7,680,163. The average number of weekly riders on the Metro Green Line rail service was 30,576, also down from the previous two years, with a total number of 2,951,505 riders in the 2002 fiscal year (MTA 2002).

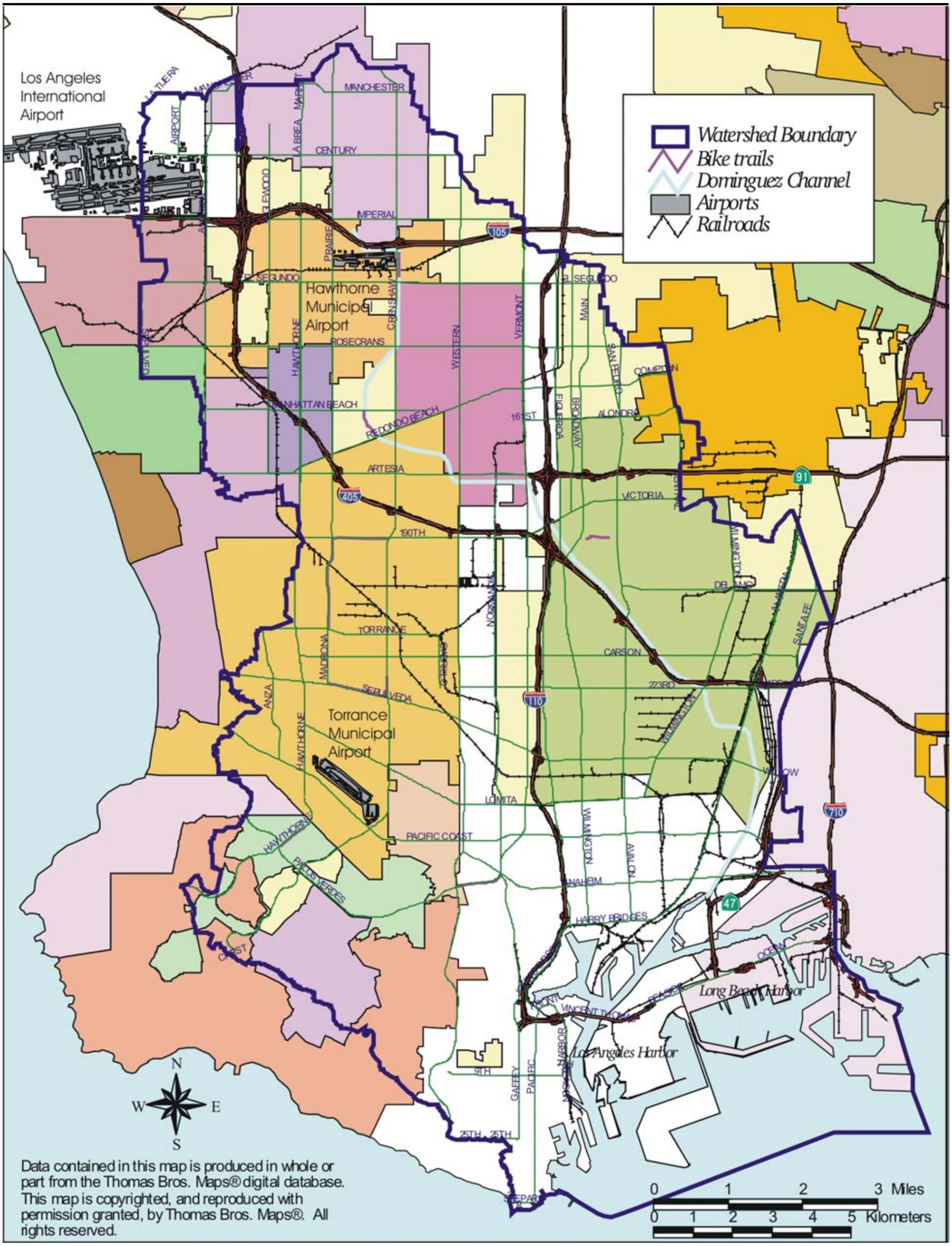


Figure 2.2-4. Major transportation routes and the location of airports within the Dominguez Watershed.

Population growth is predicted to increase by 21.7 percent from 1990 to 2010 in Los Angeles County. The MTA, is working in conjunction with the Southern California Association of Governments (SCAG), Caltrans and the Gateway Cities Council of Governments, to plan solutions for this growth. They are currently funding the I-710 corridor Study, designed to improve the mobility within the gateway communities and safer access to the ports of Los Angeles and Long Beach (SCAG 1998).

2.2.3.3 Railways

There are four primary rail corridors between the harbor area and downtown Los Angeles: one owned by the Union Pacific Railway Company (UP), one by the Atchison, Topeka, and Santa Fe Railway Company (ATSF), and two by the Southern Pacific Transportation Company (SP). The most easterly rail line is the San Pedro branch operated by UP, and runs from the port area through Long Beach, Carson, Lakewood, and points north. The line carries an average of eight through trains per day. The most westerly of the rail lines is the Harbor District Branch operated by the ATSF Railway. The line runs from the port through Wilmington, Carson, a portion of Los Angeles County, the Harbor City area of Los Angeles, Torrance, Lawndale, Redondo Beach, Hawthorne, El Segundo, Los Angeles International Airport, Inglewood, and downtown Los Angeles. The ATSF Harbor District Branch carries an average of three through trains per day. The most direct rail corridor between the port area and downtown Los Angeles is operated by the SP Railroad, and has two parallel lines. The SP San Pedro Branch begins in downtown Los Angeles and extends south along Alameda Street. It passes through Lynwood, Compton, and the Rancho Dominguez area of Los Angeles County. The SP Wilmington Branch runs parallel and west of the SP San Pedro Branch. It also begins in downtown Los Angeles and runs through Compton to Rancho Dominguez. The two SP lines join at the Dominguez Junction, which is located west of the Long Beach Freeway approximately midway between Del Amo Boulevard and the Artesia Freeway (SR-91). The combined SP tracks carry an average of eighteen through trains per day (LAHD 1997).

2.2.3.4 Shipping Patterns

The Ports of Los Angeles and Long Beach are located in San Pedro Bay. The Bay is protected by three breakwaters, known as the San Pedro Breakwater, Middle Breakwater, and Long Beach Breakwater. The openings between the breakwaters, known as Angels Gate and Queens Gate, provide entry to the Port of Los Angeles and the Port of Long Beach, respectively. A variety of vessel types travel or reside within the port areas. These include fishing boats, passenger-carrying vessels, pleasure boats, auto carriers, container ships, dry bulk carriers, and barges. Commercial vessels follow vessel traffic lanes established by the U.S. Coast Guard when approaching and leaving the harbor (LAHD 1997). Shipping traffic is substantial in the harbors, which together rank as the third busiest port in the world. As such, there is the potential for impacts to water quality from vessel leaks, cleaning, and/or accidental discharges. The ports implement storm water pollution prevention programs with their tenants to minimize impacts to water quality and to assist with regulatory compliance.

2.2.3.5 Airports

There are three airports within the watershed. A variety of routine airport activities occur that may impact water quality. Many of these activities present the potential for storm water pollutants to be discharged into the storm drain system. The activities that have the greatest potential of contributing to storm water pollution are:

- Aircraft, vehicle, and equipment maintenance.
- Aircraft, vehicle and equipment fueling.

- Aircraft, vehicle, and equipment washing.
- Pesticide/herbicide usage.
- Chemical, waste or fuel storage.
- Tire wear during aircraft landing.

Based on the nature of maintenance activities at airports, materials such as lubricating oils, hydraulic oils, degreasers, and other cleaning products are commonly used during maintenance activities. Waste oils, lubricants, and transmission fluids are accumulated and stored at local collection points prior to transport to recycling facilities. Small leaks or spills of these materials are not uncommon during maintenance activities. Potential pollutants consist primarily of oil, grease, and petroleum hydrocarbons. Small amounts of additional pollutants including solvents, heavy metals, pesticides, herbicides, lavatory waste, and citrus-based degreasers may also be present (http://phoenix.gov/AVIATION/documents/storm/pga_section2.pdf).

A brief description of each of the airports within the watershed are given below.

Los Angeles International Airport (LAX)

Los Angeles International Airport (LAX) is ranked third in the world for number of passengers and tonnage of air cargo handled. In 2001 more than 61.6 million people traveled through LAX, and its air cargo system handled more than 2 million tons of goods. International freight was nearly 50 percent of this total. The LAX site has been used as a general aviation field since 1928, commercial airline service started in December 1946, and the present terminal complex was constructed in 1961. According to a 1995 study, LAX has an annual economic impact of $60 billion. An estimated $21 billion of this total is generated within the City of Los Angeles. Approximately 408,000 jobs, spread throughout the region, are attributable to LAX, and employment in the City of Los Angeles due to the airport is estimated to be 158,000 jobs (http://www.lawa.org/lax/htmlaf/gd.html).

Torrance Municipal Airport

The Torrance Municipal Airport occupies 202 hectares (500 acres), of which 57 hectares (140 acres) are leased at commercial rates for non-aeronautical purposes. A total of 145 hectares (360 acres) are aeronautical. About 5 hectares (140 acres) of the aeronautical land is open and partially used for agriculture. The airport has two runways that are capable of handling a maximum aircraft weight of 9,080 kilograms (20,000 lbs.) per wheel. The combination of length and weight capacity makes the runways near ideal for general aviation, but are not recommended for air carrier type aircraft. In 1980 there were 185,849 local operations and 170,143 transient operations (355,992 total operations). By the end of the decade local operations had fallen to 112,774 (-39 %), and transients to 130,550 (-23%), a total of 243,324 operations. Some types of aircraft are banned from the airport because they are felt to be "too noisy" and incapable of meeting the City's stringent noise ordinance (http://www.ci.torrance.ca.us /city/dept/airport /overview.htm).

Hawthorne Municipal Airport

The Hawthorne Municipal Airport is a general aviation reliever airport (FAA designation), owned and operated by the City of Hawthorne. Of the total 32 hectares (80 acres) that constitute the airport, 21 hectares (53 acres) are used as aircraft operation areas with 27 used for terminal, aircraft storage facilities and leases. The lighted runway is 1,511 meters (4,956 feet) long and 30 meters (100 feet) wide and can accommodate aircraft weighing up to 40,860 kilograms (90,000 pounds) (dual tandem wheel loading) (http://www.cityofhawthorne.com/air_index.htm).

2.2.4 Natural and Imported Resources

2.2.4.1 Petroleum Resources

The petroleum industry in the Dominguez Watershed is over 120 years old, with commercial production of oil beginning in 1882. Most of the major oil and gas fields were discovered between the 1920s and 1940s. Oil production in the region peaked during the 1960s and has been declining since, although the region continues to produce significant petroleum resources.

Several major oil companies are based in the area, with production, refining, transportation, and marketing facilities employing over 39,000 people in 1999. In 1998, the Los Angeles basin produced approximately 30.3 billion liters (8 billion gallons) of gasoline, 7.9 billion liters (2.1 billion gallons) of jet fuel, and 8.7 billion liters (2.3 billion gallons) of diesel. Locations of major oil refineries in the watershed are shown on Figure 2.2-5.

The Wilmington oil field, discovered in 1932, is the sixth largest in the state, producing some 16.8 million barrels in 2000. The field extends beneath the Ports of Long Beach and Los Angeles. Other major oil and gas fields in the Dominguez Watershed are shown below in Table 2.2-8.

Table 2.2-8. Oil and gas production in the Dominguez Watershed in 2000.

Field	Oil (barrels)	Net Gas Withdrawal (mcf)	Water (barrels)
Dominguez	0	50,000	0
El Segundo	22,900	4,880	153,000
Lawndale	2,400	4,870	35,400
Torrance	557,000	154,000	15,000,000
Wilmington	16,800,000	4,120,000	332,000,000

Note: mcf: million cubic feet
Source: Department of Conservation, Division of Oil, Gas, and Geothermal Resources 2000

2.2.4.2 Water Supply

Imported Water

Because local supplies are insufficient to meet water demands, the region imports approximately two-thirds of its water supply. Since the turn of the century, extensive water development has been carried out in the South Coast Region. Steady expansion of population and of the economy led to the demands and financial resources to build large water supply projects for importing water to the region. In 1913, the Los Angeles Aqueduct (LAA) began importing water from the Owens Valley to the South Coast Region. Los Angeles diversions from the Mono Basin began in 1940 when the LAA was extended by about 17.7 kilometers (11 miles) (a second conduit was added in 1970). In 1941, the Metropolitan Water District of Southern California (MWD) completed its Colorado River Aqueduct, which now provides about 25 percent of the region's supply. The State Water Project (SWP) began delivering water from the Delta to the South Coast Region in 1972.

The Los Angeles Department of Water and Power (LADWP) owns and operates the LAA, which diverts both surface and groundwater from the Owens Valley and surface water from the Mono Basin. The combined carrying capacity of the aqueduct system is about 21.5 cubic meters per second (cms) (760 cubic feet per second (cfs)), or about 550 thousand acre-feet per year (taf/yr). An average of 400 taf/yr of water is delivered through the Los Angeles Aqueduct with a record 534 taf in 1983. Court-ordered restrictions on diversions from the Mono Basin and Owens Valley have reduced the amount of water the City of Los Angeles can divert to about 321 taf/yr. An acre-foot is about 326,000 gallons, which is about the amount of water used by two typical southern California families in and around their home in a year.

MWD was created in 1928 to construct and operate the Colorado River Aqueduct (CRA) to deliver Colorado River water to southern California. MWD wholesales water supplies from the Colorado River and the SWP to water agencies throughout southern California.

MWD and its 26 member agencies serve 95 percent of the South Coast Region. Some agencies rely solely on MWD for their water supply, while many, like the City of Los Angeles, rely on MWD to supplement existing supplies. Between its fiscal years 1970 and 1994, the City of Los Angeles purchased an average of 130 taf/yr from MWD, about 20 percent of the City's total water supply.

MWD has received Colorado River water since 1941 under contracts with the United States Bureau of Reclamation (USBR). These contracts have allowed the diversion of 1,210 taf/yr, as well as 180 taf/yr of surplus water when available. (The maximum capacity of the CRA is 1,300 taf/yr.) California's basic apportionment of Colorado River water is 4,400 taf/yr plus one-half of any surplus water, when available.

MWD is the largest SWP contractor, with an annual entitlement of more than 2,000 taf (California Department of Water Resources 1998).

Water Reuse/Reclamation/Recycling

In 1993 the USBR, eight local agencies, and the LADWP began evaluating the feasibility of regional water recycling in southern California. The eight participating local agencies are: Central and West Basin Municipal Water Districts, City of Los Angeles, City of San Diego, MWD, San Diego County Water Authority, Santa Ana Water Project Authority, and South Orange County Reclamation Authority. Regional planning would take advantage of potential surpluses of recycled water that could serve needs in areas throughout southern California. The plan of study called for a three-part, six-year comprehensive effort to identify a regional recycling system and develop potential recycling plants. The study has identified regional and areawide water recycling potential for 20 and 50 year planning horizons. An economic distribution model will be used to maximize the allocation of recycled water at minimum cost throughout the region (California Department of Water Resources 1998).

Since the 1970s, southern California has been a leader in developing water recycling plants and projects. Recycled water is currently used for applications that include groundwater recharge, hydraulic barriers to seawater intrusion, landscape and agricultural irrigation, and direct use in industry. Currently, some 80 recycling plants throughout southern California are producing about 210 taf/yr of new water supply. It is estimated that these existing plants will provide an additional 70 taf/yr of water supply by year 2020.

Almost 40 new water recycling plants and distribution systems were evaluated as future water supply augmentation options for the region. Water recycling could potentially increase by 639 taf by 2020, yielding about 527 taf of new water. The price of recycled water from these options ranges from $180/acre-feet (af) to more than $2,500/af. This large range is due to the individual characteristics of proposed projects. Some entail major capital costs for construction of new treatment plants while others may involve only distribution systems from an existing plant. For example, projects designed for groundwater recharge are often located near the treatment plant reducing the costs for distribution. As another example, projects that are designed for landscape irrigation or direct industrial uses will generally be higher in cost because of the extensive distribution system needed for delivery (California Department of Water Resources 1998).

Within the Dominguez Watershed, there is one water recycling facility. In 1995, the West Basin Municipal Water District (WBMWD) completed construction of the West Basin Water Recycling Facility in El Segundo; identified on Figure 2.2-5 as West Basin. The plant recycles 31 taf of water per year from the City of Los Angeles' Hyperion wastewater treatment plant for distribution to industrial and landscape users and into the West Coast Basin Barrier (California Department of Water Resources 2001). The locations of existing and planned recycled water pipelines are shown on Figure 2.2-5. Note that the majority of recycled water distribution pipelines are located in the northern portion of the watershed, near the Hyperion Treatment Plant and West Basin Water Recycling Facility.

Groundwater

Groundwater is a major local supply source in the various counties in MWD's service area. Groundwater basins (Figure 2.2-6) are located along the coast and inland valleys of the region. Many of these basins are actively managed by public agencies or have been adjudicated by the courts. Some groundwater basins are as large as several hundred square miles in area and have a capacity exceeding 10 million acre-feet (maf). The South Coast's current estimated annual groundwater use is about 1,200 taf. Recharge occurs from natural infiltration along river valleys, but in many cases facilities have been constructed to recharge groundwater with local, imported, or recycled supplies. For example, in average years the LACDPW recharges groundwater with 230 taf from local flows, 60 taf from imported water, and 50 taf from recycled water. These different surface supplies not only replenish groundwater basins, but can be banked for later use. Programs are in place to bank imported water, when available in wetter periods, to increase groundwater production during the summer season and in drought years (California Department of Water Resources 1998).

The Dominguez Watershed is underlain by two groundwater basins, the West Coast Basin to the west and south, and the Central Basin to the north and east. The basins are separated by the Newport-Inglewood Fault, although there is some hydraulic connection between them. The West Coast Basin has been significantly affected due to groundwater pumping since the early part of the 20th century. In the 1870s, residents of Inglewood and Long Beach used artesian wells and springs that then existed to the east of the Newport-Inglewood fault. By 1904, the springs were gone and there were approximately 100 wells in the area producing 10,000 acre-feet of water per year. During the 1920s, well water levels in the West Coast Basin dropped below sea level, such that by 1932 the entire coastal aquifer was impacted by sea water intrusion. In the mid 1940s, the agencies charged with preserving underground water supplies and finding supplemental water recommended establishment of the West Basin Municipal Water District, which was approved by the voters in 1947. Subsequently, two projects (the West Coast Barrier Project and the Dominguez Gap Project) were constructed by LACDPW to control seawater intrusion by injecting clean water through a series of injection wells parallel to the coast and along San Pedro Bay. The Silverado Aquifer, underlying most of the West Coast Basin, is the most productive unit, yielding 80 to 90 percent of the extracted groundwater in the Basin (California Department of Water Resources). Discussion of groundwater hydrology and quality is presented in Subsection 2.3.3, and the West Coast Barrier and Dominguez Gap Projects are further discussed in Subsection 2.3.3.3.

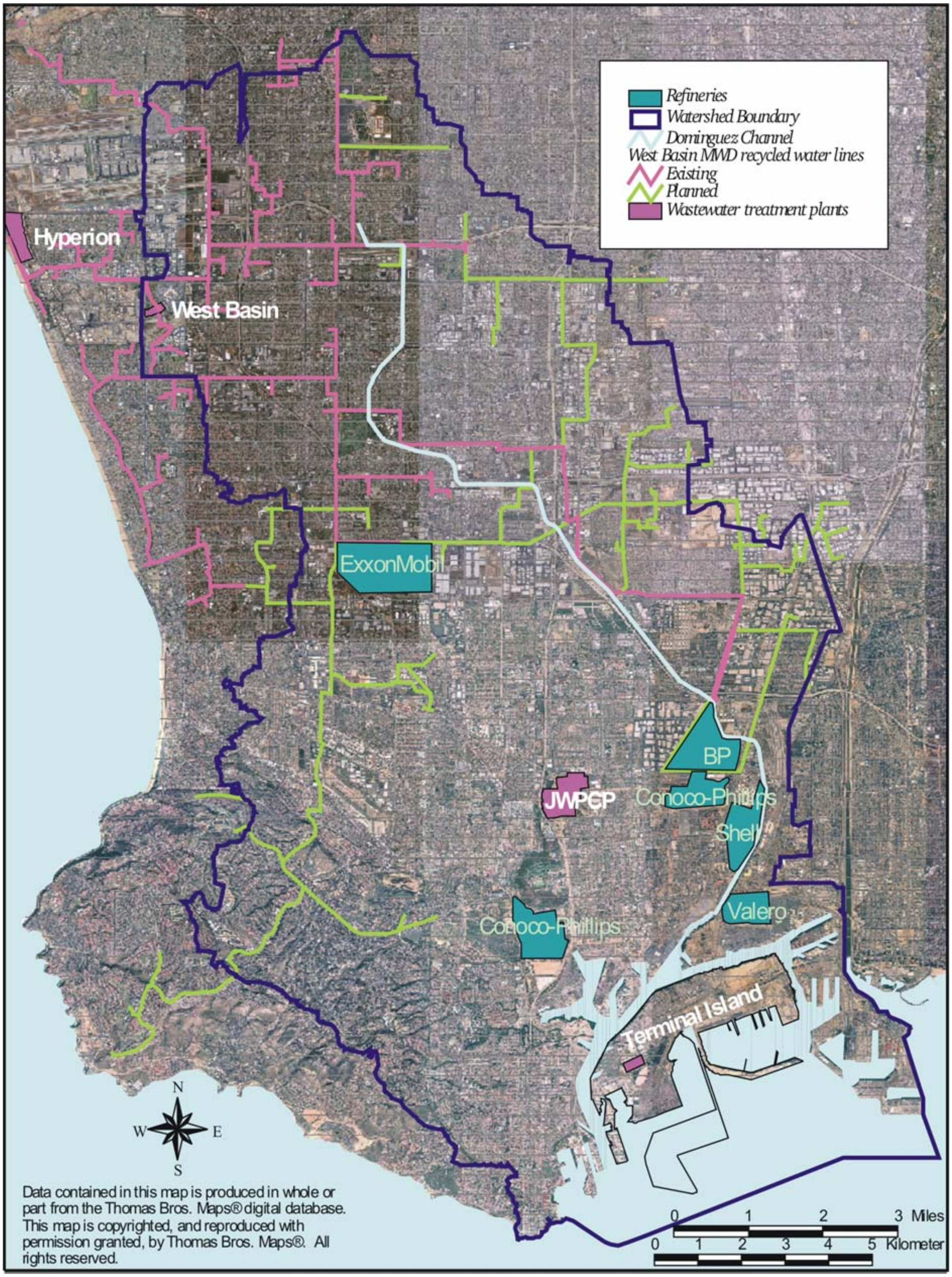


Figure 2.2-5. Locations of major oil refineries, wastewater treatment plants, and existing and planned recycled water lines within the Dominguez Watershed.

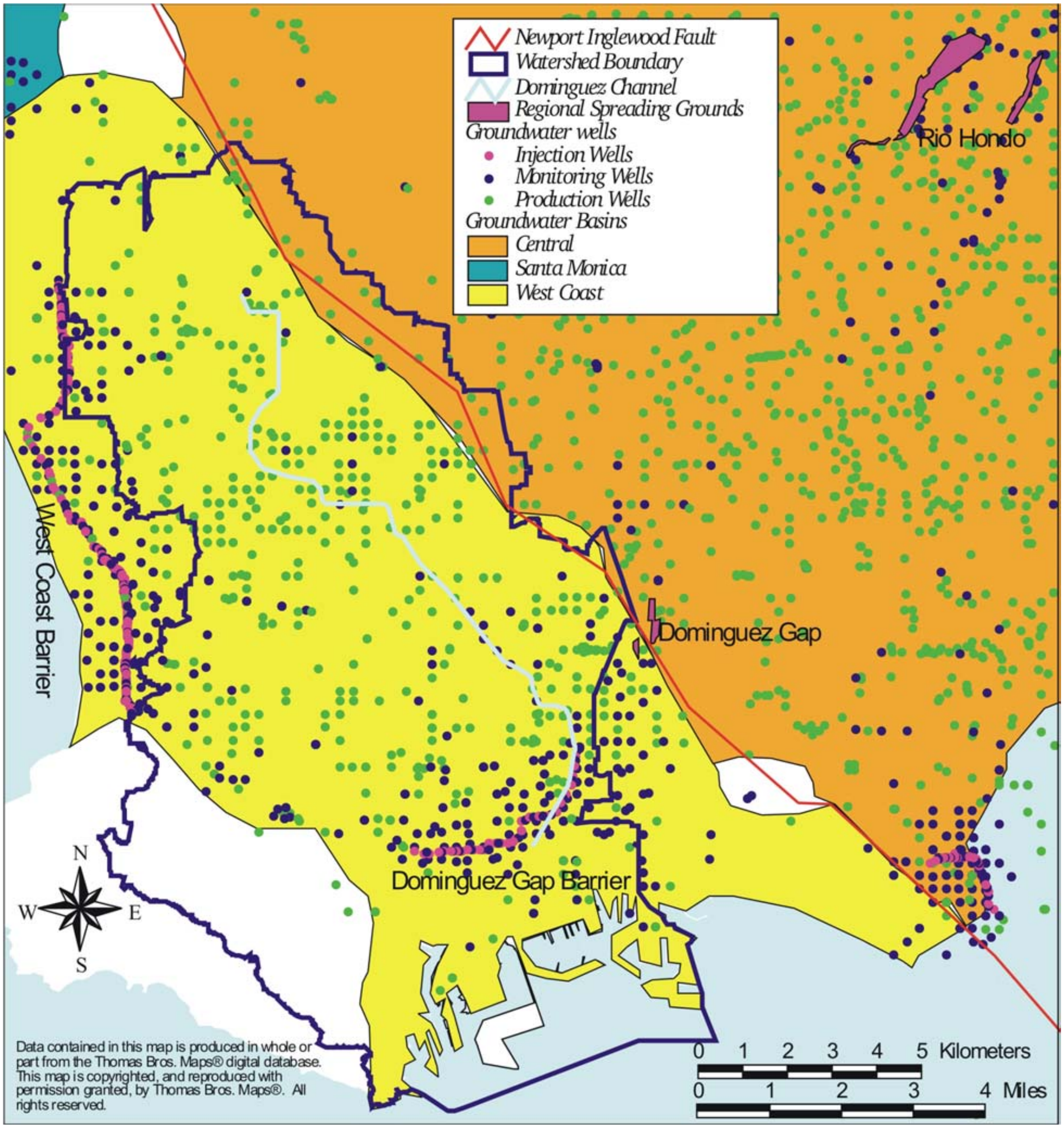


Figure 2.2-6. Groundwater basins and groundwater wells in the Dominguez Watershed.

2.2.5 Public Services and Utilities

In general, all cities and unincorporated County area within the watershed boundary have their water supply, water treatment, and solid waste disposal services served by those districts/department described below. Under the discussion of individual cities and county area, other suppliers are described, as appropriate. This section only addresses supplies of services to those portions of the cities that are within the watershed.

2.2.5.1 Water Supply

City of Los Angeles

Water in the City of Los Angeles is supplied by the LADWP. The LADWP obtains its water from three principal supply sources: the Los Angeles Aqueduct (water supplied from the eastern Sierra Nevada Mountains), local groundwater wells, and water purchased by the MWD from the Colorado River and State Water Project (www.ladwp.com). A small amount of water is from reclamation of wastewater (for specific non-drinking use).

Aqueduct

Aqueduct deliveries have on average supplied about half of the City's water needs over the last ten years. Court decisions to provide additional aqueduct water to benefit the environment in the Mono Basin and the Owens Valley have limited the City's aqueduct deliveries. As a result, the median annual LAA delivery over the next 20 years is expected to be approximately 321 taf, which will satisfy about 50 percent of the City's water needs.

Local Groundwater

The City is entitled to 110 taf/yr from the San Fernando Basin (SFB), Central, Sylmar and West Coast groundwater basins. Since 1970, local wells have produced about 95 taf/yr accounting for 15 percent of the City's total water supply. About 80 percent of this groundwater comes from the SFB with the remaining basins making up the balance. Groundwater basins in the watershed are shown in Figure 2.2-6.

In emergencies or during prolonged drought periods, additional groundwater can be extracted from the SFB. The City has established stored water credits in the SFB that can be drawn upon during long-term shortages and other emergencies to supplement its normal supply. As of 2000, the City's stored water credit was almost three times its annual entitlement from the SFB.

MWD

Founded in 1928, the MWD today serves 26 member agencies in southern California encompassing 5,200 square miles with a population of nearly 16 million people. The MWD is the largest wholesaler of water in California. On average, the MWD provides approximately 35 percent of the City's water supply. LADWP has historically purchased MWD water to make up the deficit between demand and the City's own supplies. The City has made significant investments in the MWD's infrastructure and plans to continue relying on the MWD to meet its current and future supplemental water needs.

Recycled Water

Currently, LADWP and Los Angeles County Sanitation District may supply recycled water to users in the City of Los Angeles. See Subsection 2.2.4 for additional discussion of water recycling within the watershed.

Alternative Water Supplies

A key element to ensuring the City's future water supply reliability is the availability of viable options for alternative water supplies. Currently available options that can supplement traditional supplies include water marketing, desalination, additional local groundwater production, and further conservation of local storm water runoff. LADWP closely follows developments in these areas, and will continue to support MWD in its efforts to develop supplemental supplies for the region.

Water Conservation

Water conservation will be used to meet a substantial portion of increases in the City's water demands created by population growth (www.ladwp.com). The City has employed various conservation measures as a means to provide a sustainable source of water supply to the City. Some of the ways LADWP fosters conservation area include tiered water pricing, financial incentives for the installation of ultra-low-flush toilets and water efficient washing machines, technical assistance programs for business and industry, and large landscape irrigation efficiency programs. The success of the City's conservation program can be summarized by the fact that despite a population increase of slightly over 35 percent (or nearly one million people) since 1970, current water use has grown by only 7 percent, and per capita usage has been reduced by 15 percent.

Water Demands

Annual water demands in Los Angeles today are about 660 taf/yr with an average per capita use of 150 gallons per day. About two-thirds of the City's demand is for residential uses, almost equally shared by single-family and multi-family units. About one quarter of the demand is for commercial and governmental uses, with a very small amount used by industry. The City's water demand is expected to grow to 756 taf/yr by 2015, an increase to support the projected population of 4,550,000.

The LADWP also provides electricity to 1.4 million residential and business customers and water to 650,000 customers (or 3.7 million people). The company has power plant interests that give it 2,000 mega watts of generating capacity; it also buys and sells wholesale power. Most of the city's water supply is transported through two aqueduct systems from the Sierra Nevada Mountains; other water sources include wells and local groundwater basins. Because LADWP is city-owned, its retail monopoly status was unaffected by utility deregulation in California.

Cities Other than City of Los Angeles

Information is available online for most cities' services. Individual city websites can be accessed through one common site known as www.statelocalgov.net. Information not otherwise referenced for individual cities below was taken from this website.

Cities generally pump groundwater from their adjudicated rights and/or contract with a local water agency for imported water such as the Southern California Water Company (SCWC), or the California Water Service Company (CWSC). The WBMWD buys imported water from the MWD and wholesales the imported water to the SCWC and CWSC. While most cities within the watershed purchase imported water from the SCWC and/or CWSC, the City of Long Beach and City of Torrance are member agencies of the MWD, and purchase their imported water directly from the MWD. Most city water services are supplemented by one or more wells that serve in case of emergency backup. Wells throughout the watershed area are subject to treatment. A primary concern is the prevention of contamination of the groundwater by surface contaminants leaching into the soil and aquifer. Most cities pump from zones where the water contains natural gas, color, iron and manganese which must be treated to meet drinking water standards. These are regional concerns.

Most cities have a complex system of distribution lines, valves, hydrants, reservoirs (above and underground). Some cities having more topographic differential and take advantage of gravity feed, and save on pumping.

Carson: Water is provided locally by CWSC and SCWC, which purchase imported water from the WBMWD water. The General Plan Environmental Impact Report (EIR) states that there are sufficient water supplies to serve Carson with the new General Plan, however new development and growth would be subject to specific evaluation of the existing system's capacity, and measure includes conservation should be considered (City of Carson 2002). Other goals include maintaining and improving existing systems and to pursue funding for improvements.

Gardena: Gardena is serviced by the SCWC, which purchases imported water from the WBMWD. A portion of the City's supply is via water wells through SCWC.

Hawthorne: Hawthorne is serviced by the SCWC and CWSC, which purchases imported water from the WBMWD.

Inglewood: The City operates wells and in 1997 had three (City of Inglewood 1997) that drew from the local aquifer to supplement the City's supply of imported water. The City is serviced by the SCWC, which purchases imported water from the WBMWD.

Lawndale: The City is serviced by the SCWC, which purchases imported water from the WBMWD.

Lomita: Water service is provided locally by the Lomita Water Department except for a small portion of 211 homes on the southern portion of the City serviced by SCWC. Both agencies purchase imported water from the WBMWD. Water supply also includes emergency connections with the City of Torrance and with the MWD Palos Verdes Reservoir. The City also has one standby well.

As per the questionnaire sent to the jurisdictions, Lomita foresees a problem of diminishing water supply. The city does have areas where they use drought resistant plants for conserving water, including four parks and the Lomita Railroad Museum. Lomita charges higher water rates for excessive water use.

Long Beach: The City of Long Beach Water Department provides water to the city from a combination of wells and through purchase of MWD water.

The Long Beach Water Department has begun work on the Long Beach Conjunctive Use Project (one of several throughout the greater Los Angeles basin), that are innovative groundwater storage projects. The Long Beach project will provide up to 1.4 billion gallons of water for the Long Beach area during dry years, which will allow the Department to maximize the use of the groundwater basin that runs under the City of Long Beach, strengthening the City's water supply reliability while maintaining water rate affordability.

Partnering with the Central Basin Municipal Water District, the MWD, City of Compton, City of Torrance, and the WBMWD, the Long Beach Water Department will receive Proposition 13 funding, 100 percent of the projects' total cost, from the State of California to capture excess water during wet years and store it in the giant Central Groundwater Basin for use in dry years. In essence, conjunctive use allows water purveyors to meet the constant demand for water despite a regions variable hydrology.

The project will utilize excess capacity in the Central Groundwater Basin (located northeast of Long Beach) to store up to 13,000 af, or 4.2 billion gallons, of surplus imported water in normal to wet hydrologic years. When called by MWD, this storage will be extracted over a certain period of time and utilized to meet retail demands within the City of Long Beach, in addition to baseline groundwater production during that same period. Surface deliveries of imported water to Long Beach replaced by the additional groundwater production will be used by MWD to meet demands elsewhere in southern California (www.longbeach.gov/water/pdf/longbeachccr.pdf). The current status is that the agreement is in effect and the Central Basin Municipal Water District is acting as an administrative agent.

Manhattan Beach: The City's water system consists of four pump stations, two storage reservoirs, one elevated storage tank, and two water supply wells. The majority of the water supply is imported with purchases from the WBMWD.

Pacific Corridor Area of Los Angeles (Near the Harbor): Within the Pacific Corridor Redevelopment Project area of the City of Los Angeles, near the most southern portion of the watershed boundary, water supply is served by LADWP (THA 2001).

Palos Verdes Estates: A small portion of the east end of Palos Verdes Estates is in the watershed boundary. Due to the adjacent communities the following is assumed: The City receives its water service from the CWSC, which purchases its water from the WBMWD.

Rancho Palos Verdes: The eastern, central and north sections of Rancho Palos Verdes are in the watershed boundary. The City receives its water service from the CWSC, which purchases imported water from the WBMWD.

Redondo Beach: The City receives its water service from the CWSC, which purchases imported water from the WBMWD. For operation and maintenance purposes The City of Redondo Beach is classified within the Hermosa-Redondo District, an area containing both cities and a 324-hectare (800-acre) portion of the City of Torrance (City of Redondo Beach 1992).

Rolling Hills: The local water provider is CWSC, which purchases imported water from the WBMWD. Groundwater resources and wells are nonexistent due to the city's underlying geologic formations. With a stable population, no substantial increase in demand is foreseen (City of Rolling Hills 2001).

Rolling Hills Estates: The City receives its water from the CWSC, which purchases imported water from the WBMWD.

Torrance: The City receives imported water from the MWD.

2.2.5.2 Water Treatment

Wastewater treatment involves processes that, at minimum, remove solids to a level that meets regulatory water quality standards. The treatment processes include preliminary, primary, secondary, and tertiary, each of which removes progressively finer grains of solids. At the end of secondary treatment, most solids have been removed from the water. Tertiary treatment eliminates remaining impurities through filtration and disinfection.

There are three wastewater treatment plants that serve the jurisdictions within the watershed (Figure 2.2-5). The Joint Water Pollution Control Plant (JWPCP), operated by the Los Angeles County Sanitation Districts is located at 24501 S. Figueroa Street, Carson. The plant occupies approximately 142 hectares (350 acres) to the east of the Harbor (110) Freeway. The JWPCP is the largest of the Districts' wastewater treatment plants, providing full secondary treatment for up to 400 million gallons of wastewater per day (mgd). The plant serves a population of approximately 3 ½ million people. The JWPCP serves communities throughout the entire South Bay, as well as communities as far east as Downey and as far north as Inglewood. The treated wastewater is disinfected with chlorine and sent to the Pacific Ocean through a network of outfalls that extends approximately 3 kilometers (two miles) off the Palos Verdes Peninsula to a depth of 61 meters (200 feet).

The Terminal Island Treatment Plant (TITP), located at 455 Ferry Street, Terminal Island, can treat up to 30 mgd. TITP discharges tertiary treated wastewaters to the harbor.

The Hyperion Treatment Plant is located outside the watershed boundary, but is important to note since it serves portions of the watershed, and is the source of recycled water to the West Basin Water Recycling Facility. Contained within 58 hectares (144 acres), Hyperion treats 400 mgd and is one of the largest treatment plants in the United States. It discharges secondary treated wastewaters to Santa Monica Bay.

Information on individual cities was obtained through the common website (www.statelocalgov.net) unless otherwise noted.

Carson: Carson is served by the JWPCP in Carson. No new sewer line upgrades are planned in the city. As with the water lines, continued maintenance, improvement and replacement of aging water and wastewater systems will ensure the provision of services (City of Carson 2002). Also funding sources will be pursued.

Gardena: The City of Los Angeles, Bureau of Sanitation is responsible for provision of sewer infrastructure and the treatment of wastewater.

Hawthorne: The City of Los Angeles, Bureau of Sanitation is responsible for provision of sewer infrastructure and the treatment of wastewater.

Inglewood: City of Inglewood wastewater goes to the JWPCP in Carson (City of Inglewood 1997).

Lawndale: It is unknown at this time whether the City or County provides service to Lawndale.

Lomita: City of Lomita wastewater is treated at the JWPCP in Carson (City of Lomita 1998).

Long Beach: The City of Long Beach uses the JWPCP in Carson and the TITP on Terminal Island (City of Long Beach 1973).

Based on information online, the City of Long Beach aggressively markets loan programs to assist recycling manufacturing businesses in the Recycling Market Development Zone and to create jobs for the local community. These programs include Small Business Association loan programs, City revolving loan programs, capital availability loan programs, and California Integrated Waste Management Board Direct loan program.

City of Los Angeles Harbor Area: Sewer service in the harbor is provided by the LACDPW, Bureau of Sanitation. The harbor uses the TITP.

Manhattan Beach: The City of Manhattan Beach wastewater is treated at the JWPCP in Carson. As of 1988, some lines in the City were in need of repair (City of Manhattan Beach 1988). No updated information was available through the literature search.

Pacific Corridor Area of Los Angeles (Near the Harbor): The City of Los Angeles, Bureau of Sanitation is responsible for provision of sewer infrastructure in the Pacific Corridor area and the treatment of wastewater. Wastewater generated in the area is transported by sewer lines to the TITP which has a daily flow of 26 mgd and a 30 mgd capacity A system of major interceptors exist within the Terminal Island Service Area Boundary to transport sewage to the TITP (THA 2001).

Palos Verdes Estates: The City receives its service from the JWPCP in Carson.

Rancho Palos Verdes: Wastewater is treated at the JWPCP in Carson. Due to landslide areas and shifting ground, sewage lines (and other utilities) have the potential for breakage. This is most predominant in the Portuguese Bend slide area which is outside of the watershed.

Redondo Beach: Wastewater is treated at the JWPCP in Carson.

Rolling Hills: With the exception of 13 residences (City of Rolling Hills, Housing Element 2001), that have individually or through the creation of a small sewer district hooked in with adjacent jurisdiction's sewer systems, there is no sanitary sewer system in Rolling Hills. Residences are served by individual septic tanks and leach lines. This helps to retain the rural atmosphere and prohibit higher density housing including construction of second units. Potential for additional sewer hookups is limited due to the prohibitive cost of extending sewer lines for long distances from County sewer lines, geologic issues, and costs if the city were to provide such services.

Rolling Hills Estates: Wastewater is treated at the JWPCP in Carson.

Torrance: Sewage is collected for treatment at the JWPCP in Carson.

2.2.5.3 Sewer Lines

Most cities have complex systems of sewer lines feeding into larger lines to move the raw sewage to the treatment facility. In a few cases (e.g., City of Rolling Hills), almost all residents are on septic systems. Some cities also have agreements for treatment with other local providers as described above.

<u>County Collection</u>

The Sanitation Districts operate a comprehensive solid waste management system serving the needs of a large portion of Los Angeles County (www.lacsd.org). This system includes three active sanitary landfills, two recycle centers, two transfer/materials recovery facilities, and three gas-to-energy facilities.

In addition, the Sanitation Districts maintain three closed sanitary landfill sites, and through joint venture agreements, participate in the operation of two refuse-to-energy facilities. A new 3,629-metric-ton per day (4,000 tons) materials recovery facility, at the Puente Hills Landfill, has been designed and is in the initial phase of construction. Some solid waste from the cities within the watershed is taken to Puente Hills. Those cities not using contractors to collect solid waste who are not contracted with the County use other local, private fills.

The Sanitation Districts' sanitary landfills and transfer/materials recovery facilities are operated under various agreements. Fifteen of the seventeen Sanitation Districts signatory to the Joint Outfall Agreement for sewerage services have also entered into a Joint Solid Waste Management System Agreement to finance and operate solid waste management facilities located within the boundaries of existing sanitation districts. These "Sanitation Districts System" facilities include:

- <u>Puente Hills Landfill</u> which is the largest landfill in the nation, near the City of Whittier.
- The <u>Closed Spadra</u> and <u>Palos Verdes</u> Landfills.
- <u>DART</u> and <u>South Gate</u> Transfer/Materials Recovery Facilities located in the Cities of Downey and South Gate, respectively.
- <u>Palos Verdes</u> and <u>Puente Hills</u> Recycle Centers.

The Puente Hills Landfill, along with the Puente Hills Materials Recovery Facility and DART, will form the initial infrastructure for a waste-by-rail system (the rail transport of waste to distant disposal facilities). The Sanitation Districts have entered into purchase agreements for two fully permitted rail-served landfill sites in Riverside and Imperial Counties as part of the waste-by-rail system.

<u>City Collection</u>

Refuse generated in the City of Los Angeles is collected by private contractors and taken to the City of Los Angeles Bureau of Sanitation landfills (www.ladwp.com), including Calabassas (22,680 metric tons per year [mt/yr] [25,000 tons per year] [tpy] capacity), Sunshine Canyon Landfill (198,674 mt/yr [219,000 tpy capacity]), or the Bradley West Landfill (491,694 mt/yr [542,000 t/yr] capacity). Each month the City collects approximately 17,237 metric tons (19,000 tons) of recyclables, 27,216 metric tons (30,000 tons) of yard trimmings, and 54,431 metric tons (60,000 tons) of refuse.

The City has developed a Solid Waste Management Plan to meet the state mandate of AB 939. The plan consisted of implementing a residential curbside program and a commercial program for a 30-year policy and planning document that sets a waste diversion goal of 70 percent by the year 2020. The City also has a household hazardous waste collection program including a mobile collection program.

Information for individual cities was taken from the common website linking to all cities in the state (www.statelocalgov.net) unless otherwise noted.

<u>Carson</u>: Waste management collects waste and transports it to a facility in Carson where it is sorted. After greenwaste and wood and others are sorted for recycling, the remaining waste is taken to the El Sobrante Landfill in Riverside County, 121 kilometers (75 miles) from Carson. Waste Management also

uses Lancaster and Simi Valley Landfills as alternates (City of Carson 2002). Goals from the General Plan and EIR include waste reduction, and recycling, public education, and facilitation of recyclable collection.

Gardena: Refuse generated in the project area is collected by the City of Los Angeles.

Hawthorne: Refuse generated in the project area is collected by the City of Los Angeles.

Inglewood: Waste Management collects waste in the City of Inglewood.

Lawndale: Waste is taken to the County operated Puente Hills Landfill.

Lomita: Solid waste services are provided by contractors and brought to the Long Beach Waste to Energy Plant (see SERRF facility discussion under Long Beach) and recyclables are brought to Potential Industries in Wilmington (City of Lomita 1998).

Long Beach: Rapid economic development and expanding population growth in southern California has led to an ever-increasing quantity of solid waste. As indicated on the City's website, citizens and businesses in the City of Long Beach alone generate about 333,800 metric tons (368,000 tons) of residential, commercial, and industrial waste each year. Long Beach, like other southern California communities, had historically trucked its solid waste to neighborhoods outside the City for burial in landfills. Closure of a nearby landfill in 1980 led to a realization that Long Beach could no longer rely on the export of its solid waste to other neighborhoods. The City of Long Beach set in motion a comprehensive solid waste management strategy. A source reduction and recycling program was developed to reduce the amount of waste to be managed and to reduce the consumption of natural resources. Solid waste is sent to the Southeast Resource Recovery Facility (SERRF) where it is processed through one of three boilers. In addition, SERRF performs "front-end" and "back-end" recycling by recovering such items as white goods prior to incineration and collection metals removed from the boilers after incineration. Each month, an average 748 metric tons (825 tons) of metal are recycled rather than sent to a landfill.

SERRF, which began commercial operation in July 1988, is a publicly owned solid waste management facility that uses mass burn technology to reduce the volume of solid waste by about 80 percent while recovering electrical energy.

Residential and commercial solid waste is combusted in high temperature boilers to produce steam which in turn is used to run the turbine-generator producing electricity. The electricity is used to operate the facility with the remainder sold to the Southern California Edison Company (SCE). SERRF processes an average of 1,170 metric tons (1,290 tons) of municipal solid waste each day and generates up to 36 megawatts of electricity. SERRF has sold to SCE in excess of 1½ billion kilowatts of electricity.

SERRF generates enough power each year to supply 35,000 residential homes with electricity and has reduced the volume of solid waste entering a landfill by over four million cubic yards. That's equivalent to trash the length and width of a football field piled three times the height of the Empire State Building. Since the facility began operation, SERRF has processed over 3.18 metric tons (3.5 million tons) of solid waste in an environmentally safe and responsible manner. Using state-of-the-art pollution control technology, SERRF has been able to greatly reduce the amount of pollutants that naturally form during the combustion of refuse.

City of Los Angeles Harbor Area: Based on 1997 information, solid waste collected by private contractors is taken to the BKK West Covina Landfill (LAHD 1997). No information was available as to whether this is still current.

Manhattan Beach: Waste is presumed to be taken to Puente Hills Landfill.

Pacific Corridor Area of Los Angeles (Near the Harbor): Refuse generated in the project area is collected by the City of Los Angeles (THA 2001).

Palos Verdes Estates: Solid waste collected by private contractors is taken to the County Puente Hills Landfill.

Rancho Palos Verdes: Solid waste collected by Waste Management is taken to the County Puente Hills Landfill.

Redondo Beach: Waste is taken to Puente Hills Landfill (City of Redondo Beach 1992).

Rolling Hills: BFI is the contractor who picks up trash and recyclables throughout the City (City of Rolling Hills 1990).

Rolling Hills Estates: BFI collects trash and recyclables throughout the City (www.palosverdes.com).

Torrance: Waste is taken to Puente Hills Landfill (City of Torrance 1992).

2.2.5.4 Perceptions Regarding Public Services

In response to a questionnaire, several jurisdictions expressed concern about diminishing water supply; however, only a few jurisdictions indicated that incentives were being used for water conservation (Table 2.2-9). Only a couple of jurisdictions reported problems with public service capacity or infrastructure. Many of the jurisdictions left the questions related to inadequacies of public services blank on their questionnaires, which was interpreted as the information not being readily available to the person filling out the questionnaire.

Table 2.2-9. Response to questionnaire regarding inadequacies of public services.

Jurisdiction	Water Supply Concern	Incentives for Water Conservation	Sewer Line Capacity or Aging Problems	Solid Waste Capacity Problems
Carson	No	None	No	Solid waste disposal
Gardena	NA	Require compliance with State water conservation guidelines	NA	NA
Inglewood	No	NA	NA	NA
Lomita	Yes	Water rates higher for excess use	No	No
Los Angeles	Yes	(Tiered water pricing, incentives for installation of ultra-low-flush toilets and water efficient washing machines, large landscape efficiency programs)	No	No
Manhattan Beach	Yes	NA	NA	NA
Palos Verdes Estates	NA	NA	Funded new storm drain and sewer master plan	NA
Torrance	Yes	Grants for installation of water efficient equipment, tiered rate structure, ultra-low flow toilet rebate program, distribution of low flow shower heads	Insufficient capacity	
Los Angeles County	Yes	NA	NA	NA
Port of Long Beach	No	Not Applicable	No	No

NA = Not answered.
Note: Information added to the table that was not part of the response to the questionnaire is given in parentheses.

2.2.6 Recreation Resources

Recreational areas within the watershed are shown in Figure 2.2-7. This map, which was reproduced from an existing Thomas Brothers map also shows other land uses. Several of the more developed communities within the watershed are deficient in parkland and open space associated with the demand for residential, commercial, hospital, school and other uses (Table 2.2-10). Low density communities such as those along the Palos Verdes peninsula, and that occur along the beach have sufficient open space to meet the demands of those communities.

Many communities have plans to provide for new recreational facilities, although this varies from building new gyms, skate parks, pools, and improving existing facilities, to some who are striving to generate additional open space. The majority of the cities in the watershed have goals to increase park land and open space and to meet their set minimum requirements of the ratio of park acreage per each 1,000 population. Goals are also to balance continued maintenance and improvement of existing parks and recreational areas, including consideration of accessibility to persons with physical disabilities.

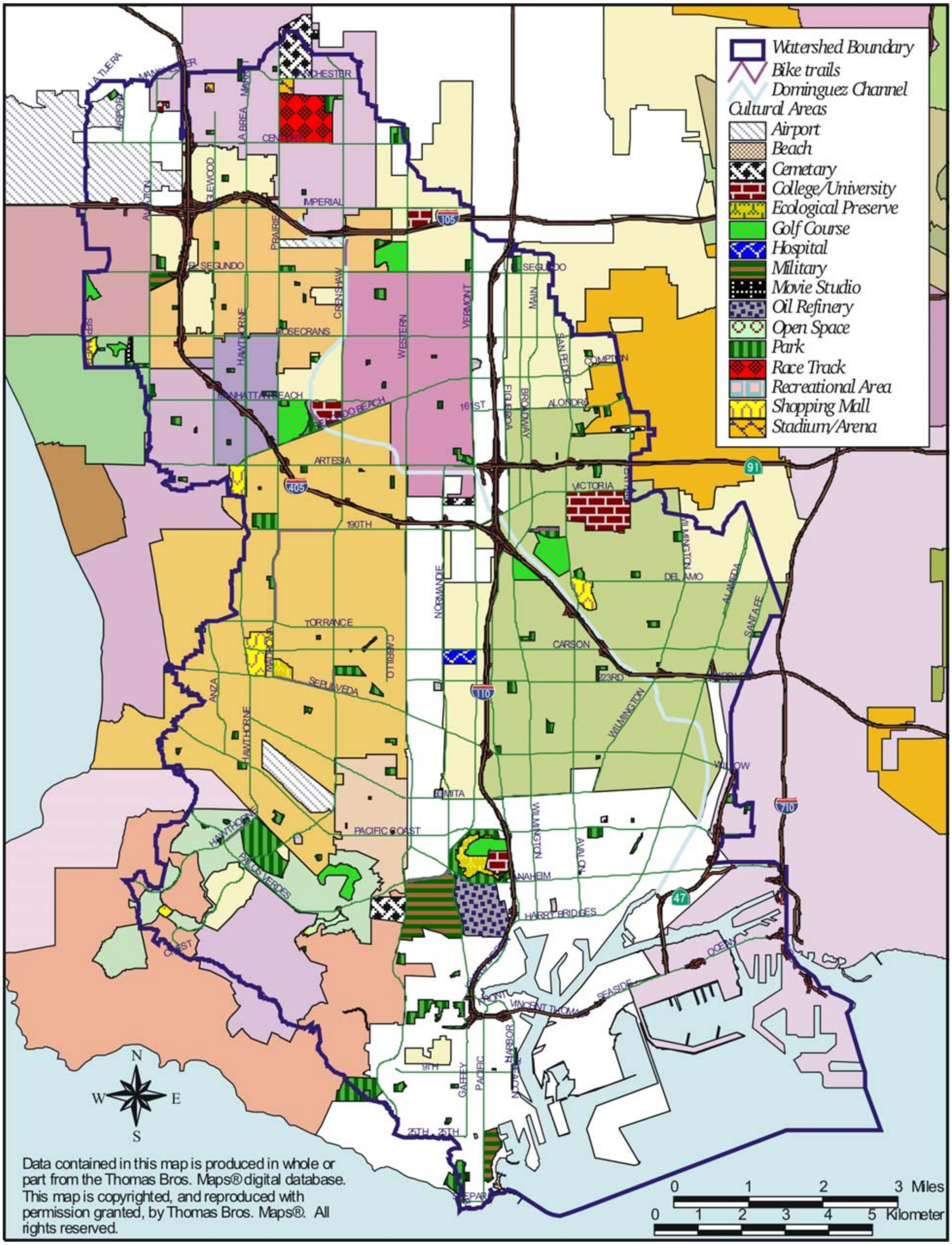


Figure 2.2-7. Recreational and other selected land uses within the Dominguez Watershed.

Table 2.2-10. Response to questionnaire regarding recreation and open space areas within the Dominguez Watershed.

Jurisdiction	Parks/Open space Meet Demand	New Parks Planned	Potential Open Space Locations	Use of Drought Tolerant Vegetation
Carson	No	Yes	Unused right-of-way parcels, degraded channels, Edison right-of-way	Yes, for water conservation
Gardena	No	No	NA	Used at 5 parks, also used for water conservation
Hawthorne	No	NA	Need	Need
Inglewood	No	No	None identified	Used at 5 parks, not used elsewhere for water conservation
Lomita	No	No	Not Applicable	Used at 5 parks
Long Beach	NA	NA	NA	Yes, for water conservation
Los Angeles	No	Yes	Acquire property for open space	Yes, for water conservation
Manhattan Beach	Yes	No	NA	Yes, for water conservation
Palos Verdes Estates	(Yes, see Table 2.2-1)			
Rancho Palos Verdes	(Yes, see Table 2.2-1)			
Redondo Beach	Yes			
Rolling Hills Estates	(Yes, see Figs. 1.4-2, 2.2-7)			
Rolling Hills	(Yes, see Table 2.2-1)			
Torrance	Yes		Considered during redevelopment	20-30% parks, 50% nature preserve
Los Angeles County	No	No	degraded channels, detention basins, utility easements	Not known
Port of Long Beach	Not Applicable	Not Applicable	Not Applicable	Yes, for water conservation
Port of Los Angeles	(Not Applicable)	(Not Applicable)	(Not Applicable)	

NA = Not answered.
Note: Information added to table that was not part of the response to the questionnaire is given in parentheses.

Areas considered for park expansion, such as school playgrounds, are increasingly being used for mobile (trailers) classroom as shortages of school space is also a regional problem. Also, many schools keep their fencing locked when schools are not in session, thus not allowing use by the public. With only 4 percent of the watershed vacant land, conservation and expansion of open space are challenges for local jurisdictions.

Some cities use setbacks, medians, plazas, gardens, cemeteries, and easements as acreage included in computing open space acreage ratios. Much of this cannot be quantified. Open space is as much a concept in additional acreage remaining undeveloped, as it is a visual enhancement, relieving the viewer of hard scape features by softening the appearance of the viewshed. Various types of open space can be vital to retaining and enhancing the suburban qualities of residential areas within many cities, especially lower density neighborhoods.

Recreational uses for the different jurisdictions within the watershed are described below.

Carson

The City of Carson has 16 public parks, one county park (Victoria), and two public golf courses (Victoria Golf Course and Dominquez Golf Course). The Carson Community Center also provides recreational programs and meeting rooms for all residents. The total amount of public parkland, including County facilities, but not the Dominquez Golf Course, is 127 hectares (315 acres) (City of Carson 2002). The Dominquez Golf Course is a 15.8-hectare (39.2-acre) private course open to the public. The City's new target for the ratio of public park acres to population is 1.6 hectares (4 acres) per 1,000 population. According to the U.S. Census for 2000, the City's population is 89,730 persons, so the current ratio of park hectares to population is approximately 1.4 hectares (3.5 acres) per 1,000 residents. However, the ratio is only 0.70 hectare (1.72 acres) per 1,000 residents if only City facilities are included.

The General Plan shows a major expansion of recreational facilities including the National Training Center at California State University at Dominquez Hills (CSUDH). The project would be 34.4 hectares (85 acres) that would include a soccer stadium, a tennis stadium, and other support facilities. A related campus improvement area would be 16.2 hectares (40 acres) include upgrades to existing soccer fields, tennis courts, track and field facilities, relocated baseball and softball fields, a relocated velodrome, and a roller hockey rink. A jogging trail would be built around the perimeter of the training center.

The City also proposes a new mini park to be located south of Sepulveda Blvd., in the utility transmission corridor. Other new recreational facilities are planned that include a new gym, stake park, and swimming pool addition to the community center. A second new pool in the city is also planned.

City of Carson park facilities shown in the General Plan are provided below.

Park and Location	Size and Facilities
Anderson Park 19101 S. Wilmington Avenue	3.4 hectares (8.5 acres): basketball courts, children's play area, Frisbee golf course, meeting/craft rooms, picnic areas. tennis courts.
Bonita Street Mini-Park	Improvements included in Capital Improvement Plan.
Calas Park 1000 W. 220th Street	3.5 hectares (8.7 acres): ball field, basketball courts, children's play area, meeting/craft rooms, picnic areas, snack bar, tennis courts, wading pools.
Carriage Crest Park 23800 S. Figueroa Street	1.4 hectares (3.4 acres): ball fields, basketball court, children's play area, meeting/craft room, picnic areas, snack bar 0.10-hectare (0.25-acre) expansion was completed in May 2002.
Carson Community Center 3 Civic Plaza Drive	4.9 hectares (12.0 acres): 6,782 sq. meters (73,000 sq. ft.): 26 meeting/craft rooms. A 502 sq. meters (5400 sq. ft.) expansion plan that will include a new senior hall and two new early childhood classrooms.
Carson Park and Pool 21411 5. Orrick Avenue 21436 S. Main Street	4.4 hectares (10.9 acres): ball fields, basketball courts, children's play area, football field, horse-shoes, meeting/craft rooms, picnic areas, snack bar, soccer field, volleyball courts, swimming pool.
Del Amo Park 703 E. Del Amo Boulevard	3.8 hectares (9.5 acres): ball fields, basketball courts, children's play area, football field, meeting/craft rooms, picnic areas, snack bar.
Dolphin Park and Pool 21205 Water Street	4.8 hectares (11.8 acres): ball fields, basketball courts, children's play area, meeting/craft rooms, picnic areas, snack bar, tennis courts, volleyball courts, wading pools.
Dominguez Park and Pool 21330 Santa Fe Avenue	3.6 hectares (9 acres): ball fields, basketball courts, children's play area, meeting/craft rooms, picnic areas, snack bar, tennis courts, swimming pool. Water feature area is being planned.
Friendship Mini Park 21930 5. Water Street	0.12 hectare (0.3 acre): children's play area, picnic areas.
Hemingway Park 700 E. Gardena Boulevard	5.3 hectares (13 acres): ball fields, basketball courts, children's play area, meeting/craft rooms, picnic areas, snack bar, tennis courts.
Mills Park	2.0 hectares (5 acres): ball fields, basketball courts, children's play area, football field,

Park and Location	Size and Facilities
700 E. Gardena Boulevard	meeting/craft rooms, picnic areas, snack bar, soccer field, tennis courts.
Perry Street Mini-Park	Agreement with owner to transfer property to City.
Scott Park and Pool 23410 Catskill Avenue	4.5 hectares (11.2 acres): ball fields, basketball courts, boxing equipment, children's play area, gymnasium, horse-shoes, meeting/craft rooms, picnic areas, snack bar, tennis courts, volleyball courts, wading pools, swimming pool, boxing center.
Stevenson Park 17400 Lysander Drive	4.7 hectares (11.7 acres): ball fields, basketball courts, children's play area, horse-shoes, meeting/craft rooms, picnic areas, snack bar, tennis courts, volleyball courts, wading pools. Gymnasium is planned;
Walnut Street Mini Park 440 E. Walnut Street	0.6 hectare (1.5 acres): basketball courts, children's play area, picnic areas.
Veterans Sports Complex and Skate Park 22400 Moneta Avenue	5.1 hectares (12.6 acres); ball fields, basketball courts, children's play area, horse-shoes, meeting/craft rooms, snack bar, tennis courts, wading pools. 25,000 sq. ft. building with basketball courts, gymnasium, volleyball courts, fitness center, racquetball courts. Skate Park is planned.
Non-City Recreational Facilities Located in Carson:	
Victoria Park (County) 419 E. 192nd Street	14.6 hectares (36 acres): ball fields, basketball courts, swimming pool, gymnasium, tennis courts, play area, recreation building, picnic area.
Victoria Golf Course (County) 340 East 192nd Street	65 hectares (161.6 acres): public regulation golf course.
Dominguez Golf Course 19800 South Main Street	15.9 hectares (39.2 acres): 18-hole, par 3 golf course with two tier driving range.

Gardena

The City has 6 parks, approximately 14.6 hectares (36 acres); 1 community center, 1 municipal pool, 1 parkette and 2 gymnasiums. The following table presents locations of the parks. The City's website currently does not have specific information on the amenities of each park.

Park	Location
Bell Park	14708 S. Halldale Ave.
Freeman Park	2100 W. 154th Place
Fukai Park	15800 S. Brighton Ave.
Rowley Park & Gymnasium	13220 S. Van Ness Ave.
Rush Gymnasium	1651 W. 162nd Street
South Park	1200 W. 170th Street
Thornburg Park	2320 W. 149th Street
Harvard Parkette	160th Street & Harvard Blvd.

According to the questionnaire, five parks (Rowley, Bell, Fukai, Thornburg and South Park) all have 100 percent drought tolerant vegetation. Current recreational facilities do not meet existing demand, and no new recreational facilities are planned at this time.

The City's Open Space and Recreation Element is dated September 1973, and thus is questionable about current information. At that time the City listed the above 5 parks as having 11.9 hectares (29.5 acres) (as compared to the website that shows currently 14.6 hectares [36 acres]). There were also 21.9 hectares (54.1 acres) of school playgrounds, and other open space not limited to storm drain and public utilities easements and vacant government-owned land. Current figures are not available for playgrounds and other open space.

According to the 1973 Element, that document refers to the National Recreation and Parks Association that adopted a standard of 4.0 hectares (10 acres) of parks and recreational area per 1,000 population, with 2.4 of each 4.0 hectares (6 of each 10 acres) as regional parks and 0.8 hectares (4 acres) to be divided into local recreation uses. In 1973, the City of Gardena had 11.9 hectares (29.5 acres) of local park areas and 21.9 hectares (54.1 acres) of school playground areas. On the basis of 4.0 hectares (10 acres) per 1,000 population, the 1973 population of 44,536 would need 180 hectares (445 acres) of parks and recreation to fulfill those then current needs.

Hawthorne

According to the City of Hawthorne's website, the Department of Recreation & Community Services includes the areas of Recreation & Youth Services, Teen & Senior Centers, a year round Aquatics program, six staffed parks, programming of the new Sport Center and the maintenance and operation of an 8.1-hectare (20-acre) Camp in Wrightwood. The Department also has responsibility for the maintenance of 7 Neighborhood Parks and the Memorial Center, Tree Trimming, and maintaining the city's phone system. A listing of the parks and amenities is shown below. Total acreage is only partially available showing 6 parks with a total of 18.5 hectares (45.6 acres).

It is noted that the City of Hawthorne General Plan is dated 1989, and their Open Space Element is also dated 1989. Thus, information contained in those documents is not current. In 1989, there was very little open space remaining in the City, mainly comprised of parks, schoolyards, easements, right-of-ways (ROWs), and small isolated lots. The City had 7 parks encompassing 14.4 hectares (35.5 acres) of park space, a municipal pool and tennis court comprising another 0.6 hectares (1.5 acres). There were 10 elementary schools that included about 20.2 hectares (50 acres) of recreational area. It was anticipated at that time, that the 20.2-hectare (50-acre) figure would diminish as its increased enrollment would require placement of trailer classrooms on portions of these play area sites.

This Element also refers to the National Recreation and Parks Association standard described above for City of Gardena. Based on the then population of 63,000, the City should contain approximately 38.2 hectares (94.5 acres) of parks but only currently has 14.6 hectares (36 acres). The city was also shown to be deficient in school playground space as well. According to the questionnaire, parks and open space are insufficient to meet demand.

The City's goals include maintaining an ongoing program of assessing and providing for open space and recreational needs.

Park	Location
Dept of Parks & Recreation	3901 W El Segundo Blvd
Betty Ainsworth Sports Center	3851 El Segundo
Bicentennial Park	Doty & 132nd
Bodger County Park	14900 Yukon Avenue
Del Aire County Park	12601 Isis Avenue
Eucalyptus Park	123rd & Inglewood
Hawthorne Memorial Park	3901 W. El Segundo Blvd
Hawthorne Pool	12220 Inglewood Avenue
Holly Park	120th Street East of Van Ness
Holly Glen Park	137th Street & Glasgow Blvd
Jim Thorpe Park	139th Street & Prairie Avenue
Ramona Park	136th Street & Ramona Avenue
Youth Center	3901 W El Segundo Blvd
Zela Davis Park	133rd Street & Kornblum

The amenities in the parks include parking, restrooms, barbecues, picnic tables, indoor facilities, tot lots, wading pools, tennis courts, baseball fields, handball courts, paddle tennis tables, horseshoes, shuffleboard, formal picnic areas, basketball courts, volleyball courts, and croquet.

Inglewood

The Open Space Element addresses the current and future recreational needs of the City and provides a plan for conservation or creation of open spaces to mitigate increasing urbanization. As of 1995 when the Element was prepared, there was only about 0.3 hectares (0.8 acres) of park per 1,000 residents (109,602 residents in 1990 Census). Standards in 1972 and 1973 would have required between 141.6 to 242.8 hectares (350 to 600 acres) of park land in the City. This will never be achieved. The City's current goal is to reestablish a park/population ratio from 1970 that calls for 0.4 hectare (1 acre) per 1,000 population. The 1995 Open Space Element projected a deficiency in parks by 2000 at 13.9 hectares (34.4 acres). According to the questionnaire, the City responded that parks do not meet current demand.

Online information for the City of Inglewood was consulted since the City's Open Space Element was prepared in 1995 and only shows 10 parks. Current online data show 13 parks (see below). The City now has over 40.5 hectares (100 acres) of open space within the 13 parks located throughout the City. The Recreation, Parks and Community Services Department offers and conducts programs with the objective of offering the community opportunities to participate in a variety of recreational and community services.

Recreational Centers and Park Facilities and activities are provided below. Amenities are based on the 1995 Open Space Element and current online information.

Park	Size	Location	Facilities
Ashwood Park	0.53 hectare (1.3 acres)	201 South Ash Avenue	Tennis, playgrounds, basketball, volleyball, picnic
Center Park	0.49 hectare (1.2 acres)	3660 West 111th Street	Playground, playing field
Circle Park	0.53 hectare (1.3 acres)	8300 Fifth Avenue	No facilities – informal playing field
Darby Park	5.67 hectares (14 acres)	3400 West Arbor Vitae Street	Playfields, softball/baseball, soccer/football, basketball, tennis, handball, wading pool, picnic, multipurpose recreational building includes gymnasium, handball courts, weight-room, meeting rooms, kitchen
Lockhaven Community Center		11125 Doty Avenue	
Queen Park	0.45 hectare (1.1 acres)	652 East Queen Street	Playgrounds, wading pool, picnic area, recreation building
Senior Citizens' Center		111 North Locust Street	
Siminski Park	0.77 hectare (1.9 acres)	9717 Inglewood Avenue	Playgrounds, picnic area, patio, community center
Centinela Adobe	0.4 hectare (1.0 acre)	7634 Midfield Avenue	Museum and Cultural Center
North Park	0.9 hectare (2.3 acres)	625 Hargrave Street	Playgrounds, tennis courts, picnic area
Rogers Park	4.0 hectares (10 acres)	400 West Beach Avenue	Playground, tennis, basketball, softball/baseball, soccer/football, wading pool, picnic area, enclosed outdoor multipurpose area (preschool area), multipurpose building including gymnasium, weight room, meeting rooms, kitchen

Park	Size	Location	Facilities
Edward Vincent, Jr. Park (formerly Centinela Park)	20.6 hectares (51 acres)	700 Warren Lane	Playfields, basketball, softball/baseball, football/soccer, tennis, golf, swimming and wading pools complex, picnic areas, outdoor amphitheater, community playhouse, multipurpose facility. Veterans Memorial Auditorium Building located adjacent as the 13^{th} facility.

Four of the City's parks, including two of the largest, Rogers and Edward Vincent Park Jr. and the Veterans Memorial Center, are located just north of the watershed boundary, and are not in the watershed. These parks still offer amenities to the city residents.

The City's Park Maintenance Division is responsible for maintaining all City Parks, medians, parkways, public restrooms and all open green space throughout the City. This includes keeping all playground equipment in safe and clean condition, mowing, edging and removing all trash from the parks. This section also maintains the City Hall complex, the City Service Center, and all of the City Libraries. This totals approximately 50.6 hectares (125 acres) of landscaping area.

School playgrounds also provide opportunities for recreation. There are 13 Inglewood Unified School District elementary schools and four secondary schools and on Los Angeles Unified School elementary school in the City. For example, there was consideration in the 1995 Open Space Element of enlarging Siminski Park to meet the needs of southwest Inglewood. A 3.84-hectare (9.5-acre) parcel owned by the Inglewood Unified School District contains a football field, baseball diamond, and other facilities. By relocating these facilities to the other two high school sites, almost 8 acres of parkland could be added to the City. However, school enrollment increases compromise consideration of relocation of facilities. This appears typical for many school/park sites throughout the watershed. Similarly other land use expansions, for residential, commercial and hospitals also compromise the balance of parklands to the population.

The City's Construction and Development Section of the Parks Division dedicates itself to maintaining the beauty of all City parks, traffic medians, and parkways through construction and repair work. We improve the image, appearance and use of parks for the general public. This Section is responsible for the maintenance and repair of equipment and facilities in all parks, including ten restroom facilities, eight playgrounds with equipment, twenty five water fountains, one Olympic sized swimming pool, one three-foot swimming pool and three wading pool pumping systems, fifty barbecue pits, thirty five picnic tables, twelve tennis courts, six basketball courts, bleachers, fences, gates, two handball courts, and one amphitheater. This also includes repairing, maintaining, and installing citywide irrigation systems. We also test, maintain, and repair back flow prevention devices. All construction, including, concrete/masonry work, and plumbing for City parks and public spaces is carried out by this Section. Repairing and maintaining all City parks and recreational areas in a safe and good working condition is a top priority for the Construction and Development Section.

Lawndale

The City of Lawndale's open space designation includes public parks, parks that are part of school sites, public and private out door recreational facilities and landscaped open space areas.

A total of 11.4 hectares (28.2 acres) of open space were identified in the Open Space Element of the General Plan (City of Lawndale 1992) that are in the watershed. Of this amount, three school sites comprised 5.95 hectares (14.70 acres), parks and community centers were approximately 4 acres, and vacant lands include utility easements and small private lots of over 4.2 hectares (10.5 acres). A railroad ROW, also considered by the City as open space is located outside of the watershed boundary.

The park facilities as per the City's website currently include those listed below. Based on 1992 data, the citywide park supply was 11.7 hectares (29 acres) short of the goal. Parks in the city are either City owned or are contracted through a Joint Powers Agreement for City utilization. The City has two primary recreation facilities, the Prairie Avenue Community Center and the Civic Center. Combined, these have 1.3 hectares (3.2 acres) of recreational use. These facilities provide meeting rooms and indoor amenities. In 1992, the City goals were to increase park amenities and develop basketball courts, volleyball, tennis, etc. on vacant parcels, and to study annexation of potential park areas. Park acreages and amenities were generally not available.

Park	Location	Facilities
Rogers/Anderson	4161 W. Manhattan Beach Blvd	(City contracted)
Jane Addams Park	15114 Firmona Avenue	(City contracted)
Frank Hogan Tot Lot	4045 W. 167th Street	A 557 square meter (6,000 square foot) play area (City owned)
Community Garden	160th Street	2,230 square meter (24,000 square foot) pocket park (City owned)
William Green Park	4558 W.168th Street	(City contracted) – this is located just outside of the watershed area

Lomita

According to the General Plan (City of Lomita 1998), the City of Lomita has 5 parks totaling approximately 10 acres. The following presents locations and facilities of the parks.

Park	Location	Facilities
Lomita Park & Recreation Center	24428 Eshelman Avenue	Gymnasium, multi-purpose court, baseball diamond, tennis courts, tot lot wading pool, & picnic area
Hathaway Park	25600 Pennsylvania Avenue	Basketball court, volleyball court & tot lot
Railroad Museum & Annex	2135 250th street	Museum, & picnic area
Metro Park	26339 Oak Street	Grass area
Veterans Memorial Park	25700 Walnut Street	Grass area

According to the questionnaire, the City uses native and drought resistant plants at all five park locations for conserving water.

Long Beach

According to the Long Beach website, there are 98 parks with 26 community centers, two major tennis centers, one of the busiest municipal golf systems in the country with five courses, the largest municipally operated marina system in the nation with 3,800 boat slips and 18 kilometers (11 miles) of beaches. More than 1,255 hectares (3,100 acres) within the City's 129 square kilometers (50 square miles) are devoted to recreation.

The City of Long Beach adopted a strategic plan in June 2000 that includes new parks, recreation and marine recreation planning, and open space planning, which updated the previous 1973 document. Only a small portion of the City of Long Beach is located in the watershed, and most is the industrialized Port area. Only three recreational areas are in the Dominguez Watershed.

Park	Size
Queen Mary Events Park	1.6 hectares (4.0 acres)
South Shore Launch Ramp	2.4 hectares (6.0 acres)
Golden Shore Marine Reserve	2.6 hectares (6.4 acres)

City of Los Angeles Including Harbor Area

The Port area encompasses portions of Terminal Island, Wilmington and San Pedro, which are Districts of Los Angeles and are in the watershed. In addition, a narrow but long strip of the City of Los Angeles lies between the City of Carson (on the east) and the cities of Torrance and Lomita (to the west). Only land-based recreational areas were identified within the watershed. According to the Port Master Plan and The Pacific Region Recreation and Parks map, there are 19 parks/recreational areas within the Dominguez Watershed. The following is a list of the areas.

Park	Location
Alma Park	21st & Meyler Street
Anderson Park	828 S. Mesa Street
Angeles Gate Park	3601 Gaffey Street
Averill Park	1300 Dodson Avenue
Banning Park & Recreation Center	1331 Eubank Street
Martin J. Bogdanovich Recreation Center	1920 Cumbre Drive
Daniels Field Sports Center	845 W. 12th Street
East Wilmington Greenbelt Park	M Street to Sanford, on Drumm Avenue
John S. Gibson Jr. Park	Harbor Boulevard between 5th & 6th streets
Harbor City Recreation Center	24901 Frampton Avenue
Harbor Highlands Park	825 Capitol
Harbor Sports Center	1221 N. Figueroa Place
Leland Park	863 S. Herbert Avenue
Ken Malloy Harbor Regional Park	25820 Vermont Avenue
Normandale Recreation Center	22400 S. Halldale
Peck Park Community Center	560 N. Western Avenue
Rancho San Pedro	275 W. 1st Street
Rena Park	510 Leland Avenue
San Pedro Plaza	700 S. Beacon Street
Wilmington Recreation Center	325 Neptune Avenue

According to the questionnaire, most of the City parks have between 0 to 30 percent native, drought-tolerant vegetation with exotic species problems. In addition, none of the parks use recycled water.

While the Port is largely an industrial harbor, there are shoreline on-water recreational opportunities. Facilities located on the water's edge include Banning's Landing community center, Cabrillo Beach and fishing pier, Cabrillo Marina, Cabrillo Marine Aquarium, Los Angeles Maritime Museum, Los Angeles Harbor Sport-fishing and Harbor Cruises facility, Ports O'Call Village, and 22nd Street Landing all located along the San Pedro Waterfront.

Pacific Corridor Area of Los Angeles (Near the Harbor)

Within the Pacific Corridor Redevelopment Project area of the City of Los Angeles, near the most southern portion of the watershed boundary, there are thirteen park/recreational facilities. According to the City of Los Angeles Public Recreation Plan, to meet long-range recreational standards, a project must have 0.8 hectare (2 acres) of neighborhood recreational facilities for every 1,000 people within 0.8

kilometer (0.5 mile) of a project, and 0.8 hectare (2 acres) of community and other recreational facilities within 3.2 kilometers (2 miles). The current population of the project area should have 8.4 hectares (20.7 acres) of neighborhood recreational facilities as well as 8.4 hectares (20.7 acres) of community recreational facilities. Currently there is a total of 15.0 hectares (37.1 acres) of neighborhood recreational facilities and 141 hectares (348.4 acres) of other recreational facilities.

Manhattan Beach

The City of Manhattan Beach General Plan is dated 1988, thus more current information was extracted from the City of Manhattan Beach website. Throughout the City there are 11 parks providing 32.4 hectares (80 acres) of parkland within the community. This acreage includes 18 ball fields, 5 batting cages, 18 tennis courts, 4 racquetball courts, 3 basketball courts, 2 par courses, a 2.7 kilometer (1.7 mile) jogging path, a 9-hole golf course, and a large recreational pool. At Mira Costa High School, in addition to athletic fields and tennis courts, facilities available for public use include a gymnasium and track. Also located within the City is a 3.2-kilometer (2-mile) walking and jogging path that runs parallel to a bike path along the beach. Stretching along the beach spanning north and south of the Manhattan Beach pier are over 150 volleyball courts, which are also available for private and public use. Several of these facilities are outside the watershed boundary. The following is a list of the facilities and their locations within the Dominguez Watershed..

Park	Size	Location
Eighth Street Parkette	Approximately 0.16 hectare (0.4 acre)	1700 block of Eighth Street
Manhattan Heights Park	Approximately 1.61 hectares (4 acres)	1600 Manhattan Beach Boulevard
Manhattan Village Field	Approximately 1.21 hectares (3 acres)	1300 Parkview Avenue West of Manhattan Country Club.
Marine Avenue Park	Approximately 3.04 hectares (7.5 acres)	1625 Marine Avenue
Marine Sports Park	No area given	1600 Marine Avenue
Marriott Municipal Golf Course	No area given	1400 Parkview Avenue
Parque Culiacan	Approximately 1.21 hectares (3 acres)	Highland and 27th Street
Polliwog Park	Approximately 7.28 hectares (18 acres)	Corner of Redondo Avenue and Manhattan Beach Boulevard

Palos Verdes Estates

Only the far eastern portion of this City is in the watershed. The Parklands Department is responsible for the maintenance, development and preservation of the City's 202 hectares (500 acres) of Parkland and unimproved right-of-way.

Rancho Palos Verdes

According to the General Plan and official city website, there are two parks or recreation areas in the watershed area. The Miraleste Recreation and Park District - The Miraleste Recreation and Park District contains 13 hectares (32 acres) of canyon area, used as a sanctuary for native wildlife. Friendship Park, which is 50 hectares (123 acres), is approximately half in and outside the watershed boundary at the eastern boundary of the City.

Redondo Beach

The City of Redondo Beach General Plan is dated 1992, and is thus 10 years old. The City's website was used as it contains more current data on park facilities. According to the City of Redondo Beach website, the City's parkland covers approximately 40.5 hectares (100 acres) of land. Much of that is outside the watershed boundary. The following is a list of the facilities, amenities, and their locations within the Dominguez Watershed.

Park	Size	Location	Facilities
Anderson Park	2.43 hectares (6.0 acres)	2229 Ernest Avenue	Play equipment, picnic areas, senior center, modular buildings, scout houses, basketball and tennis courts.
Andrews Park	0.65 hectare (1.61 acres)	1801 Rockefeller Ln	A picnic shelter, grass, and play equipment
Aviation Park	5.78 hectares (14.28 acres)	1935 Manhattan Beach Boulevard	The Redondo Beach Performing Arts Center, a gymnasium, and track and field.
Fulton Playfield	0.51 hectare (1.25 acres)	529 Earle Lane	A little league field
Perry Park	1.67 hectares (4.13 acres)	2301 Grant Avenue	A teen center, senior center, scout house, sports field, basketball courts, play equipment, and picnic areas.

Rolling Hills

Most of Rolling Hills is in the watershed. Only one small portion along the southern boundaries is outside the watershed. The City contains 33.3 acres of recreational open space. There are three city owned tennis courts, which are operated and maintained by the Rolling Hills Community Association. Also contained within the city are two riding rings and a series of trails. Also available for recreational use within Rolling Hills is an 8.01 acres parcel located on the north end of Storm Hill, which was dedicated through provisions of the Quimby Act. The property is open to city residents for use as an open equestrian area. Rolling Hills is a private, gated community located atop the scenic hills of the Palos Verdes Peninsula, CA. Incorporated in 1957; Rolling Hills maintains a ranch style/equestrian environment with an enduring respect for native wildlife and natural surroundings. Some areas of vacant land/open space remain, but are constrained for development due to geological instability.

Rolling Hills Estates

Several parks and public equestrian facilities are located within the City of Rolling Hills Estates, as follows:

Park	Size	Location	Facilities
Ernie Howlett Park	14.2 hectares (35 acres)	25851Hawthorne Blvd	Four one-wall handball courts, multi-purpose athletic fields, a basketball court, a sand volleyball court, picnic tables, barbecue pits, playground, and a 3/4-mile running track and a bicycle path, as well as The Equestrian Center
Highridge Park	4.2 hectares (10.5 acres)	The corner of Crestridge and Highridge Roads	Two regulation-size soccer fields, youth softball/baseball field, barbecue pits, restrooms, picnic tables, playground equipment, approximately one mile of running track with Par Course stations, and a multi-use trail.
Chandler Park	1.4 hectares (3.5 acres)	The corner of Crenshaw Blvd and Palos Verdes Dr.	An equestrian ring and over two acres of open grass field perfect for kite flying, frisbee throwing, baseball, or an afternoon picnic. Parking is provided in the neighboring City Hall parking lot.
Dapplegray Park	0.6 hectare (1.5 acres)	The northwest corner of Palos Verdes Drive North and Palos Verdes Drive East	Several bridle trails connected directly to its riding rings. The equestrian facility contains a riding ring, a lunging ring, and a dressage area. Parking is available on Palos Verdes Drive East adjacent to the arena.

Park	Size	Location	Facilities
Silver Spur Park	NA	The southwest corner of Silver Spur Road and Palos Verdes Drive North	A 1/2 acre open grass field
Rockbluff Park	0.6 hectare (1.5 acres)	End of the Rockbluff Drive cul-de-sac	Playground equipment and benches are available.

Torrance

According to the City of Torrance General Plan and the City of Torrance website, the City has over 245 hectares (605 acres) of parkland. This acreage includes local parks, Torrance Beach, the Madrona Marsh and five acres of Civic Center Complex, which are dedicated to recreational activities. Eight park areas are outside of the watershed area; however, the following parks are within in the Dominguez Watershed.

Park	Size
Alta Loma Park	2.2 hectares (5.5 acres)
Columbia Park	21 hectares (52 acres)
Delthorne Park	3.9 hectares (9.7 acres)
Del Portola Park	5 hectares (12.5 acres)
Descanso Park	1.21 hectares (3.0 acres)
El Prado Commons	1.17 hectares (2.9 acres)
Greenwood Park	1.39 hectares (3.4 acres)
Guenser Park	3.16 hectares (7.8 acres)
Hickory Park	2.34 hectares (5.8 acres)
La Carretera Park	1.25 hectares (3.1 acres)
La Paloma Park	0.16 hectare (0.4 acre)
Lago Seco Park	1.92 hectares (4.7 acres)
Los Arboles Park	2.55 hectares (6.3 acres)
McMaster Park	2.23 hectares (5.5 acres)
Osage Park	0.08 hectare (0.2 acre)
Paradise Park	1.90 hectares (4.7 acres)
Pequeno Park	0.26 hectare (0.7 acre)
Sur La Brea Park	2.99 hectares (7.4 acres)
Torrance Park	4.11 hectares (10.2 acres)
Walteria Park	1.80 hectares (4.5 acres)
Wilson Park	N/A
Sea-Aire Park & Golf Course	2.09 hectares (5.2 acres)
Civic Center Facilities - Benstead Plunge, Recreation Center, & Joslyn Center	1.99 hectares (4.9 acres)
Pueblo Recreation Center	0.09 hectare (0.2 acre)
Las Canchas Tennis Facility	5.53 hectares (13.7 acres)
Bartlett Senior Citizen's Center	N/A
Herma Tillim Center	N/A
North Torrance Community Center	N/A
Madrona Marsh	17.00 hectares (42 acres)

N/A = Not available

In the questionnaire, Torrance stated that current recreational facilities meet exiting demand. The respondent also stated that for parks, typically 20 percent of the area is covered by native vegetation and that 20-30 percent of park area is drought tolerant. Local neighborhood parks use about 3 percent of recycled water for irrigation, while larger parks use up to 50 percent recycled water. A nature preserve (the Madrona Marsh) has up to 85 percent native vegetation, 50 percent drought tolerant vegetation, and 50 percent recycled water.

The General Plan (City of Torrance 1992) indicates that the City was declining in its' park to 1,000 population standard due to sales of school sites, and other factors.

County of Los Angeles

Recreational facilities do not meet existing demand (Table 2.2-10). LACDPW is looking into encouraging that utility easements be used for agricultural use, and promotes passive recreational activities along streams, debris basins, and rivers, etc. The creation of pocket parks on undeveloped small lots is also encouraged. Bike and equestrian trail easements are also encouraged where they will complete proposed county, state, and federal trail ways.

Open space areas within the County are, in part, defined by a land use overlay of Significant Ecological Areas (SEAs), which contribute to a balance between private development and open space conservation.

2.2.7 Summary of Land Use

The Dominguez Watershed covers a total of 345 square kilometers (133 square miles). Sixteen cities, unincorporated portions of Los Angeles County, and the Ports of Los Angeles and Long Beach have jurisdiction over land uses within the watershed. Approximately, half the watershed is under jurisdiction of the Cities of Carson, Los Angeles, and Torrance. Numerous federal, state, and local regulations govern development, redevelopment, and existing land uses within the watershed.

The watershed is highly urbanized. Approximately, 91 percent of the watershed is covered by land and 9.5 percent is covered by harbor waters. Approximately, 81 percent of the entire watershed or 93 percent of the land is developed. The dominant land use types are residential and industrial. Much of the residential is high density, single-family residences. Most of the industry is concentrated in the lower watershed, most notably petroleum industry along the lower Dominguez Channel and commercial shipping associated with the ports. The petroleum industry has been a major producer of gasoline, diesel fuel, and jet fuel for the State.

Only two percent of the land remains as open space/recreation, and much of that is in the form of parks. Approximately, 4.6 percent of the land is vacant. However, several jurisdictions have planned new developments within the watershed. While the City of Los Angeles may actively acquire property for open space, other jurisdictions use setbacks, buffers, and standards of common useable open space during review of new development and redevelopment projects as a means to conserve open space. For several jurisdictions, the guidance provided in their General Plans for conservation of open space is minimal or open space is so limited that there are few recognized opportunities for its conservation. Some jurisdictions are considering unused right-of-way and utility easements, degraded channels, and detention basins as potential opportunities for open space uses.

The Dominguez Watershed has an extensive transportation system consisting of streets, major highways, and freeways; rail service; three airports; and commercial shipping. Public transportation serves most communities within the watershed. However, with major north-south and east-west freeways providing linkage to cities within and outside the watershed, several hundred thousand vehicles travel the roads of the watershed on a daily basis.

Local communities rely on imported water sources for approximately two-thirds of the water supply used in the Dominguez Watershed. The imported water is used for domestic and industrial uses, and to replenish and protect the groundwater supply from seawater intrusion. Water recycling by the West Basin Municipal Water District provides 31,000 acre-feet of water per year for distribution to industrial and landscape users, as well as groundwater injection for use in the seawater intrusion barrier. This represents a small percentage of the local water supply. Most of the current distribution system for recycled water is located in the northwest portion of the watershed; new distribution lines to serve more of the watershed are planned.

Several of the jurisdictions have expressed concern about diminishing water supply. The City of Los Angeles and City of Torrance have financial incentive programs for water conservation, while other jurisdictions may charge higher rates for excess water use. Most jurisdictions incorporate drought tolerant plants into landscaping for water conservation purposes; however, the degree of such use was not available from most of the surveyed jurisdictions.

Only a couple of the jurisdictions within the watershed expressed concern regarding sewer lines or solid waste removal services.

2.3 Water Resources

2.3.1 Regulatory Requirements, Beneficial Uses, and Water Quality Impairments

2.3.1.1 Regulatory Requirements

In 1972, the Environmental Protection Agency created the Clean Water Act (CWA) to control the discharge of pollutants into the waters of the United States. The National Pollutant Discharge Elimination System (NPDES) permit system was created under the CWA to regulate such discharges. Point sources such as industrial wastewater and municipal sewage were the main focus of these permits, with urban runoff from commercial, residential, and light industrial areas soon recognized as an equally detrimental contributor.

The water bodies in California affected by the NPDES system are regulated under the State Water Resources Control Board (SWRCB). The State is divided into nine regions that reflect differences in water quality and quantity throughout the state. Each region has a Regional Water Quality Control Board (RWQCB) that is responsible for the creation and implementation of water quality control plans subject to State Board approval.

The Dominguez Watershed falls under the jurisdiction of the Los Angeles Regional Water Quality Control Board (LARWQCB). The LARWQCB adopted the Water Quality Control Plan, also referred to as the Basin Plan. In 1949, the Basin Plan was a general narrative description of allowable discharges into receiving waters. By 1952 numerical objectives had been set, and in 1972 all existing objectives and standards were revised to form the basis of the current Basin Plan, which was completely updated in 1994. The Basin Plan is now reviewed on a triennial basis and amendments are made on an as-needed basis.

In 1972, the SWRCB adopted the Water Quality Control Plan for Ocean Waters of California (Ocean Plan). The Ocean Plan lists beneficial uses for California's ocean waters and establishes water quality objectives necessary to achieve protection for those beneficial uses. It also sets forth a program of implementation (including waste discharge limitations, monitoring, and enforcement) to ensure that water quality objectives are met. Since 1972, the SWRCB has revised the Ocean Plan five times, most recently in March 1997.

Also in 1972, the SWRCB adopted the Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (Thermal Plan). The Thermal Plan sets limits on the discharge of elevated temperature wastes into coastal, estuarine, and interstate waters of California. The Thermal Plan was amended in 1975.

In 1974, the SWRCB adopted the Water Quality Control Policy for Enclosed Bays and Estuaries of California (Bays and Estuaries Policy, SWRCB Resolution 74-43). This resolution prohibits any new discharge of process waste into enclosed bays and estuaries and requires existing ones to be phased out at the earliest practicable date, unless enhancement of water quality can be demonstrated. The latest revision was completed in 1995 (SWRCB Resolution 95-84).

In 1991, the SWRCB adopted the Inland Surface Waters Plan (ISWP) and the Enclosed Bays and Estuaries Plan (EBEP), which were amended in 1993. Together with the Ocean Plan, and nine Regional Basin Plans, these plans were intended to satisfy the requirements of the CWA section 303(c)(2)(B) indicating that States shall adopt criteria for toxic pollutants listed in CWA section 307(a)(1). The numeric criteria for these pollutants have been published in CWA section 304(a) (FWPCA 2002). The U.S. Environmental Protection Agency (EPA) Region 9 approved these plans; however, they noted a lack of criteria for certain pollutants. Therefore, these plans did not fully satisfy the requirements of CWA section 303(c)(2)(B). As set forth in CWA section 303(c)(4), the EPA is authorized to correct deficiencies in the State's water quality standards. In 1992 (with amendments made in 1995), the EPA promulgated the National Toxics Rule (NTR) to make up for deficiencies in the ISWP and EBEP. With the NTR in place, the State of California was in compliance with CWA section 303(c)(2)(B) (USEPA 2000).

After the adoption of the ISWP and EBEP by the SWRCB, the legality of these plans was challenged by several dischargers. The Superior Court of California ruled in favor of the dischargers in 1994. The SWRCB was ordered to rescind the ISWP and EBEP on September 22, 1994. Once these plans were rescinded, the State of California was no longer fulfilling the requirements of CWA section 303(c)(2)(B).

After rescission of the plans, the SWRCB and EPA agreed (SWRCB Resolution 2000-15 and 2000-30) to pursue a collaborative approach to reestablish the regulatory framework of the rescinded ISWP and EBEP and to bring California into compliance with CWA section 303(c)(2)(B). The resolutions adopted a policy for the implementation of toxics standards for inland surface waters, enclosed bays, and estuaries of California. The approach consisted of two phases. In Phase 1, the EPA promulgated numeric water quality criteria for priority pollutants for California in accordance with the above-listed CWA section, and the SWRCB adopted statewide measures to implement those criteria in a statewide policy. In Phase 2, the SWRCB will consider the adoption of appropriate statewide water quality objectives for toxic pollutants.

The EPA established the California Toxic Rule (CTR) in 2000, which established the numeric water quality standards for California. This rule did not amend criteria already established for California in the NTR, rather it provided additional criteria based on CWA section 304(a) to fulfill the requirements of CWA section 303(c)(2)(B) for California (USEPA 2000).

The CTR criteria for fresh and marine waters are provided in Appendix A. Some criteria for fresh waters are derived based on water hardness and/or ph. Representative criteria for the Dominguez Watershed, adjusted based on historical averages of water hardness and pH, are listed in Table 2.3-1. The CTR lists criteria for maximum and continuous concentrations of several metal and organic contaminants. The Criterion Maximum Concentration is the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time (1-hour average) without deleterious effects. The Criterion Continuous Concentration is the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects. Table 2.3-1 also provides criteria for human health. This is included because portions of Los Angeles and Long Beach Harbors are used for (or potentially may be used for) shellfish consumption.

Table 2.3-1. California Toxics Rule list of constituent concentrations.

	Fresh Waters*		Marine Waters*		Human Health (10^{-6} risk for carcinogens) For Consumption Of:	
	Criterion Maximum Concentration (Acute) (µg/L)	Criterion Continuous Concentration (Chronic) (µg/L)	Criterion Maximum Concentration (Acute) (µg/L)	Criterion Continuous Concentration (Chronic) (µg/L)	Water and Organisms (µg/L)	Organisms Only (µg/L)
Hardness	354	354				
pH	7.9	7.9				
Pollutant						
Antimony					14	4300
Arsenic	340 c	150 c	69 c	36 c		
Beryllium						
Cadmium	17.7 a,c	6.0 a,c	42 c	9.3 c		
Chromium (III)	1545.3 a,c	501.3 a,c				
Chromium (VI)	16	11	1100 c	50 c		
Copper	44.2 a,c	29.4 a,c	4.8	3.1 c	1300	
Lead	322.8 a,c	12.6 a,c	210 c	8.1 c		
Mercury					0.05	0.051
Nickel	1364.3 a,c	152.0 a,c	74 c	8.2 c	610	4600
Selenium			290 c	71 c		
Silver	30.3 a,c		1.9 c			
Thallium					1.7	6.3
Zinc	342.0 a,c	344.8 a,c	90 c	81 c		
Cyanide	22	5.2	1	1	700	220000
Asbestos					7000000 fibers/L	
2,3,7,8-TCDD (Dioxin)					1.3E-08	1.4E-08
Acrolein					320	780
Acrylonitrile					0.059	0.66
Benzene					1.2	71
Bromoform					4.3	360
Carbon Tetrachloride					0.25	4.4
Chlorobenzene					680	21000
Chlorodibromomethane					0.401	34
Chloroethane						
2-Chloroehtylvinyl Ether						
Chloroform						
Dichlorobromomethane					0.56	46
1,1-Dichloroethane						
1,2-Dichloroethane					0.38	99
1,1-Dichloroethylene					0.057	3.2
1,2-Dichloropropane					0.52	39
1,3-Dichloropropylene					10	1700
Ethylbenzene					3100	29000
Methyl Bromide					48	4000
Methyl Choride						
Methylene Chloride					4.7	1600
1,1,2,2-Tetrachloroethane					0.17	11
Tetrachloroethylene					0.8	8.85
Toluene					6800	200000

Table 2.3-1. (Continued).

	Fresh Waters*		Marine Waters*		Human Health (10^{-6} risk for carcinogens) For Consumption Of:	
	Criterion Maximum Concentration (Acute) (µg/L)	Criterion Continuous Concentration (Chronic) (µg/L)	Criterion Maximum Concentration (Acute) (µg/L)	Criterion Continuous Concentration (Chronic) (µg/L)	Water and Organisms (µg/L)	Organisms Only (µg/L)
1,2-Trans-Dichloroehtylene					700	140000
1,1,1-Trichloroethane						
1,1,2-Trichloroethane					0.6	42
Trichloroethylene					2.7	81
Vinyl Chloride					2	525
2-Chlorophenol					120	400
2,4-Dichlorophenol					93	790
2,4-Dimethylphenol					540	2300
2-Methyl-4,6-Dinitrophenol					13.4	765
2,4-Dinitrophenol					70	14000
2-Nitrophenol						
4-Nitrophenol						
3-Methyl-4-Chlorophenol	21.6 b	16.5 b	13	7.9		
Pentachlorophenol					0.28	8.2
Phenol					21000	4600000
2,4,6-Trichlorophenol					2.1	6.5
Acenaphthene					1200	2700
Acenaphthylene						
Anthracene					9600	110000
Benzidine					0.00012	0.00054
Benzo(a)Anthracene					0.0044	0.049
Benzo(a)Pyrene					0.0044	0.049
Benzo(b)Fluoranthene					0.0044	0.049
Benzo(ghi)Perylene						
Benzo(k)Fluoranthene					0.0044	0.049
Bis(2-Chloroethoxy)Methane						
Bis(2-Chloroethyl)Ether					0.031	1.4
Bis(2-Choroisopropyl)Ether					1400	170000
Bis(2-Ethylhexyl)Phthalate					1.8	5.9
4-Bromophenyl Phenyl Ether						
Butylbenzyl Phthalate					3000	5200
2-Chloronaphthalene					1700	4300
4-Chlorophenyl Phenyl Ether						
Chrysene					0.0044	0.049
Dibenzo(a,h)Anthracene					0.0044	0.049
1,2 Dichlorobenzene					2700	17000
1,3 Dichlorobenzene					400	2600
1,4-Dichlorobenzene					400	2600
3,3'-Dichlorobenzidine					0.04	0.077
Diethyl Phthalate					23000	120000
Dimethyl Phthalate					313000	2900000
Di-n-Butyl Phthalate					2700	12000
2,4-Dinitrotoluene					0.11	9.1
2,6-Dinitrotoluene						
Di-n-Octyl Phthalate						

Table 2.3-1. (Continued).

	Fresh Waters*		Marine Waters*		Human Health (10^{-6} risk for carcinogens) For Consumption Of:	
	Criterion Maximum Concentration (Acute) (μg/L)	Criterion Continuous Concentration (Chronic) (μg/L)	Criterion Maximum Concentration (Acute) (μg/L)	Criterion Continuous Concentration (Chronic) (μg/L)	Water and Organisms (μg/L)	Organisms Only (μg/L)
1,2-Diphenylhydrazine					0.04	0.54
Fluoranthene					300	370
Fluorene					1300	14000
Hexachlorobenzene					0.00075	0.00077
Hexachlorobutadiene					0.44	50
Hexachlorocyclopentadiene					240	17000
Hexachloroethane					1.9	8.9
Indeno(1,2,3-cd)Pyrene					0.0044	0.049
Isophorone					8.4	600
Naphthalene						
Nitrobenzene					17	1900
N-Nitrosodimethylamine					0.00069	8.1
N-Nitrosodi-n-Propylamine					0.005	1.4
N-Nitrosodiphenylamine					5	16
Phenanthrene						
Pyrene	3		1.3		960	11000
1,2,4-Trichlorobenzene						
Aldrin					0.00013	0.00014
alpha-BHC	0.95		0.16		0.0039	0.013
beta-BHC					0.014	0.046
gamma-BHC	2.4	0.0043	0.09	0.004	0.019	0.063
delta-BHC	1.1	0.001	0.13	0.001		
Chlordane					0.00057	0.00059
4,4'-DDT					0.00059	0.00059
4,4'-DDE	0.24	0.056	0.71	0.0019	0.00059	0.00059
4,4'-DDD	0.22	0.056	0.034	0.0087	0.00083	0.00084
Dieldrin	0.22	0.056	0.034	0.0087	0.00014	0.00014
alpha-Endosulfan					110	240
beta-Endosulfan	0.086	0.036	0.037	0.0023	110	240
Endosulfan Sulfate					110	240
Endrin	0.52	0.0038	0.053	0.0036	0.76	0.81
Endrin Aldehyde	0.52	0.0038	0.053	0.0036	0.76	0.81
Heptachlor		0.014		0.03	0.00021	0.00021
Heptachlor Epoxide	0.73	0.0002	0.21	0.0002	0.0001	0.00011
Polychlorinated biphenyls (PCBs); Sum Total of 7 Aroclors					0.00017	0.00017
Toxaphene					0.00073	0.00075

Notes:
- * In cases of brackish water, the more stringent of the fresh water or marine water criteria apply.
- a Expressed as a function of total hardness (mg/L) in the water body. The hardness value used in this table was based on data collected from fresh waters by LACDPW (1987 to 1995) and LARWQCB (1967 to 1968 and 1986 to 1992); see Tables 2.3-23 and 2.3-24.
- b Expressed as a function of pH in the water body. The pH value used in this table was based on data collected from fresh waters by LACDPW (1987 to 1995) and LARWQCB (1967 to 1968 and 1986 to 1992); see Tables 2.3-23 and 2.3-24.
- c Expressed as the dissolved fraction of the metal in the water column.

2.3.1.2 *Beneficial Uses*

The Basin Plan establishes beneficial uses for surface and ground waters, creates water quality objectives to maintain the designated beneficial uses, describes programs to protect the beneficial uses, and describes monitoring activities to evaluate the effectiveness of the Basin Plan.

Water quality objectives for each beneficial use are established under the California Porter-Cologne Water Quality Control Act (The California Water Code) and the CWA and varies depending upon the type of use (e.g., when ingestion by humans is likely to occur, stricter standards must be met).

Basically, a beneficial use of a water body is one of the ways that water can be used for the benefit of people and/or wildlife. Examples include drinking, swimming, industrial and agricultural water supply, and the support of fresh and saltwater aquatic habitats. Definitions of the acronyms used to describe the various beneficial uses used in the Basin Plans are presented in Table 2.3-2.

Beneficial uses designated for the Dominguez Watershed water bodies are summarized in Table 2.3-3. Presently, there are twelve existing beneficial uses and two proposed beneficial uses (LARWQCB 1994). All of the water bodies have multiple beneficial uses, and all are listed for existing or potential REC1 and REC2 use. Proposed uses are listed as a means of establishing goals for state and federal mandated water quality improvements. In addition to the water bodies listed in Table 2.3-3, groundwater basins (discussed in Section 2.3.3) and wetlands also have beneficial uses. Uses of groundwater may include, but are not limited to, municipal, industrial service supply, and agricultural applications. State and federal designated wetlands in the watershed such as Madrona Marsh and Machado Lake (previously known as Harbor Lake) are protected under federal and state regulations to ensure no overall net loss of the wetlands.

Table 2.3-2. Beneficial use definitions for waterbodies in the study area.

Acronym	Use	Definition
MUN	Municipal and Domestic Water Supply	Uses of water for community, military, or individual water supply systems including, but not limited to, drinking water supply.
AGR	Agricultural Supply	Uses of water for farming, horticulture, or ranching including, but not limited to, irrigation, stock watering, or support of vegetation for range grazing.
PROC	Industrial Process Supply	Uses of water for industrial activities that depend primarily on water quality
IND	Industrial Service Supply	Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization.
GWR	Ground Water Recharge	Uses of water for natural or artificial recharge of ground water for purposes of future extraction, maintenance of water quality, or halting of saltwater intrusion into freshwater aquifers.
NAV	Navigation	Uses of water for shipping, travel or other transportation by private, military, or commercial vessels.
POW	Hydropower Generation	Uses of water for hydropower generation.
REC-1	Water Contact Recreation	Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.

Table 2.3-2. (Continued).

Acronym	Use	Definition
REC-2	Non-contact Water Recreaton	Uses of water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
COMM	Commercial and Sport Fishing	Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including, but not limited to, uses involving organisms intended for human consumption or bait purposes.
WARM	Warm Freshwater Habitat	Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish or wildlife, including invertebrates.
COLD	Cold Freshwater Habitat	Uses of water that support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
EST	Estuarine Habitat	Uses of water that support estuarine ecosystems including, but not limited to, preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).
MAR	Marine Habitat	Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife (e.g., marine mammals, shorebirds).
WILD	Wildlife Habitat	Uses of water that supports terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
BIOL	Preservation of Biological Habitats	Uses of water that support designated areas or habitats, such as areas of special biological significance (ASBS), established refuges, parks, sanctuaries, ecological reserves, or other areas where the preservation or enhancement of natural resources requires special protection.
RARE	Rare, Threatened, or Endangered Species	Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.
MIGR	Migration of Aquatic Organisms	Uses of water that support habitats necessary for migration, acclimatization between fresh and salt water, or other temporary activities by aquatic organisms, such as anadromous fish.
SPWN	Spawning, Reproduction, and/or Early Development	Uses of water that supports high quality aquatic habitats suitable for reproduction and early development of fish.
SHELL	Shellfish Harvesting	Uses of water that support habitats suitable for the collection of filter feeding shellfish (e.g., clams, oysters, and mussels) for human consumption, commercial, or sports purposes.
WET	Wetland Habitat	Uses of water that support wetland ecosystems, including, but not limited to, preservation or enhancement of wetland habitats, vegetation, fish, shellfish, or wildlife, and other unique wetland functions which enhance water quality, such as providing flood and erosion control, stream bank stabilization, and filtration and purification of naturally occurring contaminants.

Source: LARWQCB 1994

Table 2.3-3. Beneficial uses for water bodies within the Dominguez Watershed.

	MUN	IND	NAV	REC1	REC2	COMM	WARM	EST	MAR	WILD	RARE	MIGR	SPWN	SHELL	WET[b]	PROC	AGR
LOS ANGELES AND LONG BEACH HARBORS																	
Cabrillo Beach			E	E	E	E			E	E		E	Eas				
Outer Harbor			E	E	E	E			E		E			P			
Marinas		E	E	E	E	E			E		E			P			
Public Beach Areas			E	E	E	E			E	E	E		P	E			
All Other Inner Areas		E	E	P	E	E			E		Ee			P			
INLAND SURFACE WATER																	
Dominguez Channel below Vermont			P	Es	E	E		E	E	E	Ee	Ef	Ef				
Dominguez Channel above Vermont	P*			Ps	E		P			P	E						
Wilmington Drain (Bixby Slough) and Machado (Harbor) Lake[1]	P*			E	E		E			E	E				E		
Madrona Marsh[1]				P	E		P			E					E		
GROUNDWATER																	
West Coast Basin	E	E														E	E

Notes:

[1] This water body is listed as a Significant Ecological Area (SEA). Although the 1994 Basin Plan did not list this water body as a BIOL beneficial use it does hold the potential for the BIOL designation.

E: Existing beneficial use

P: Potential beneficial use

E and P shall be protected as required

* Asterixed MUN designations are designated under SB 88-63 and may be considered for functional exemptions RB 89-03. Some Designations may be considered for exemptions at a later date.

as: Most frequently used grunion spawning beaches. Other beaches may be used as well.

b: Waterbodies designated as WET may have wetlands habitat associated with only a portion of the water body. Any regulatory action would require a detailed analysis of the area.

e: One or more rare species utilize all ocean, bays, estuaries, and coastal wetlands for foraging and/or nesting.

f: Aquatic organisms utilize all bays, estuaries, lagoons and coastal wetlands, to a certain extent, for spawning and early development. This may include migration into areas, which are heavily influenced by freshwater inputs.

s: Access prohibited by Los Angeles County DPW.

See Table 1.4-1 on page 1-7 for definitions of beneficial uses.

Source: LARWQCB 1994

The primary use of the Dominguez Channel and all other open channels in the Dominguez Watershed, including Wilmington Drain, Machado Lake, and Madrona Marsh, is flood protection. Major floods throughout the Los Angeles Basin in the early 1900s resulted in huge damages and loss of life; and brought a public outcry for action to address the recurrent flooding problems. In response, the Los Angeles County Flood Control District was established in 1915 to provide for the control and conservation of the flood, storm, and other wastewaters to protect the harbors, waterways, public highways and property in the district from damage from such waters. Taxpayers approved bond issues in 1917 and 1924 to build the initial major dams. However, taxpayers were not willing to provide enough funds for substantial infrastructure downstream of the dams. In 1938 a four-day, countywide flood caused $40 million in damages ($360 million in 1994 dollars). A total of 113 lives were lost and the Red Cross declared it the fifth largest flood in history at that time. The general public demanded action and federal assistance was requested. One of the major structures constructed soon after the flood was the Dominguez Channel, which provides protection from a fifty-year storm event for much of the South Bay area.

2.3.1.3 Water Quality Impairments

In 1999, the California Department of Health Services (CDHS) expanded its regulations for public beaches and ocean water-contact sports areas as required by Assembly Bill 411 (Statutes of 1997, Chapter 765) which amended specific Health and Safety Code sections. These regulations include new standards for concentrations of bacterial indicators that are used for beach postings and closures. The AB411 criteria are applied in southern California from April 1 through October 31.

The minimum protective bacterial concentrations established by the AB411 criteria for waters adjacent to public beaches and public water-contact sports areas are presented in Table 2.3-4. If a single sample exceeds standards, the CDHS is required to post the applicable beach with a Beach Warning, which indicates that at least one bacterial standard has been exceeded, but there is no known source of human sewage. A beach is posted with a Beach Closure sign if the sources of the bacteria are known to be from human sewage or if there are repeated incidences of exceedances of bacterial standards from an unknown source. A closure indicates that the water is unsafe for human contact and that there is a high risk of getting ill from swimming in the water.

Table 2.3-4. AB411 criteria for bacterial indicators.

Bacterial Standards		
	Single Sample Limit[1]	**30-day Limit[2]**
Total Coliform	1,000 MPN / 100 mL if Fecal > 10% of Total, or 10,000 MPN / 100 mL, or	1,000 MPN / 100 mL, or
Fecal Coliform	400 MPN / 100 mL, or	200 MPN / 100 mL, or
Enterococcus	104 MPN / 100 mL	35 MPN / 100 mL

Notes:
[1] The total coliform single sample limit of 10,000 MPN / 100 mL drops to 1,000 when the fecal coliform value is greater than 10% of the total coliform value.
[2] The 30-day limit is based on the geometric mean of at least five weekly samples.

In 1997, the SWRCB established objectives for the protection of marine aquatic life in the California Ocean Plan (SWRCB 1997). Those objectives are listed in Table 2.3-5.

Table 2.3-5. California Ocean Plan toxic materials limitations and water contact standards.

Constituent	LIMITING CONCENTRATIONS			
	Units of Measurement	6-Month Median	Daily Maximum	Instantaneous Maximum
Arsenic	μg/L	8	32	80
Cadmium	μg/L	1	4	10
Chromium (Hexavalent)	μg/L	2	8	20
Copper	μg/L	3	12	30
Lead	μg/L	2	8	20
Mercury	μg/L	0.4	0.16	0.4
Nickel	μg/L	5	20	50
Selenium	μg/L	15	60	150
Silver	μg/L	0.7	2.8	7
Zinc	μg/L	20	80	200
Cyanide	μg/L	1	4	10
Total Chlorine Residual	μg/L	2	8	60
Ammonium (expressed as nitrogen)	μg/L	600	2,400	6,000
Chronic Toxicity	TUc		1	
Phenolic Compounds (non-chlorinated)	μg/L	30	120	300
Chlorinated Phenolics	μg/L	1	4	10
Endolsulfan	ng/L	9	18	27
Endrin	ng/L	2	4	6
HCH	ng/L	4	8	12

Notes:
Radioactivity: Not to exceed limits specified in Title 17, Division 1, Chapter 5, Subchapter 4, Group 3, Article 3, Section 30269 of the California Code of Regulations.

Bacterial Water-Contact Standards

Total Coliform: Samples from each station shall have density of total coliform organisms less than 1,000 per 100 mL; provided that not more than 20% of samples at any station, in any 30-day period, may exceed 1,000 per 100mL, and no single sample when verified by a repeat sample taken with 48 hours shall exceed 10,000 per 100mL.

Fecal Coliform: Fecal coliform density based on a minimum of not less than 5 samples for any 30-day period, shall not exceed a geometric mean of 200 per 100 mL nor shall more than 10 percent of the total samples during any 60-day period exceed 400 per 100mL.

Source: SWRCB 1997

Currently, there are no criteria comparable to the NTR for contaminated sediments. However, the National Oceanographic and Atmospheric Administration (NOAA) has produced effects-based sediment quality values for evaluating the potential for constituents in sediment to cause adverse biological effects (Table 2.3-6). NOAA has defined two effects categories: Effects Range-Low (ER-L) and Effects Range-Median (ER-M). The ER-L concentrations are equivalent to the lower tenth percentile of available data screened by NOAA and indicate the low end of the range of concentrations at which adverse biological effects are observed or predicted in sensitive species and/or sensitive life stages. The ER-M values are concentrations based on the NOAA screened data at which effects are observed or predicted in 50 percent of the test organisms evaluated. In 1995, the ER-L and ER-M concentrations were updated to include an expanded data set (Long et al. 1995).

Table 2.3-6. Sediment effects guideline values.

Parameter	Effects Range-Low (ER-L)*	Effects Range Median (ER-M)*	Threshold Effect Level (TEL) ^	Probable Effect Level (PEL) ^
Metals (mg/Kg)				
Antimony	2.0	2.5	NA	NA
Arsenic	8.2	70	7.24	41.6
Cadmium	1.2	9.6	0.68	4.21
Chromium	81	370	52.3	160
Copper	34	270	18.7	108
Lead	46.7	218	30.2	112
Mercury	0.15	0.71	0.13	0.7
Nickel	20.9	51.6	15.9	42.8
Silver	1	3.7	0.73	1.77
Zinc	150	410	124	271
Organics (μg/Kg)				
Acenaphthene	16	500	6.71	88.9
Acenaphthylene	44	640	5.87	128
Anthracene	85.3	1,100	46.9	245
Florene	19	540	21.2	144
2-Methyl Naphthalene	70	670	20.2	201
Naphthalene	160	2,100	34.6	391
Phenanthrene	240	1,500	86.7	544
Low-molecular weight PAH	552	3,160	312	1442
Benz(a)anthracene	261	1,600	74.8	693
Benzo(a)pyrene	430	1,600	88.8	763
Chrysene	384	2,800	108	846
Dibenzo(a,h)anthracene	63.4	260	6.22	135
Fluoranthene	600	5,100	113	1398
Pyrene	665	2,600	153	1398
High molecular weight PAH	1,700	9,600	655	6676
Total PAH	4,022	44,792	1684	16770
p,p'-DDE	2.2	27	NA	NA
Total DDT	1.58	46.1	NA	NA
Total PCBs	22.7	180	NA	NA

Notes:
ER-L = Concentration at lower tenth percentile at which adverse biological effects were observed or predicted.
ER-M = Concentration at which adverse biological effects were observed or predicted in 50% of test organisms.
mg/Kg = milligrams per kilogram.
μg /Kg = micrograms per kilogram.
NA = Not available.

Sources: MacDonald et al. 1986 ^, Long et al. 1995*

The SWRCB's Bay Protection and Toxic Cleanup Program (BPTCP) has referenced a lower threshold effect level (TEL) and the higher probable effect level (PEL) in assessing the potential for sediments to cause adverse biological effects. The TEL represents the guideline concentration of sediment contamination below which adverse effects are rarely expected to occur. The PEL represents the guideline concentration above which adverse effects are frequently expected to occur. Concentrations that fall between the TEL and PEL are levels at which adverse effects are expected to occasionally occur.

If the concentrations of all chemicals in a sediment sample are below the ER-L and/or TEL listed in Table 2.3-6, the sediments are not expected to be toxic. If concentrations occur between the ER-L and the ER-M and/or above the PEL, toxic effects may occur. The probability of toxicity is expected to increase with the number and level of exceedances above the ER-M and/or PEL. The values listed in Table 2.3-6 are not accepted standards or criteria. However, they are used as guidelines for effects-based toxicity evaluations. When sediment is assessed for toxicity, typically laboratory exposures of test organisms to sediment, coupled with chemistry tests, are used to assess sediment quality. The Contaminated Sediment Task Force (CSTF) is developing a database of sediment monitoring data and is expected to develop sediment quality guidelines for the Dominguez Watershed in 2003 (LARWQCB 2001b).

As the above criteria were standardized, and numerical Basin Plan objectives were set, they became the basis for the NPDES permits previously discussed. These permits are issued to regulate the amount of wastewater discharged into receiving water bodies by point and non-point sources. All facilities discharging pollutants from any point source into waters of the United States are required to obtain an NPDES permit.

There are currently (2001-2002) 141 NPDES permitted dischargers in the Dominguez Watershed (Figure 2.3-1). This includes ten major NPDES dischargers; one publicly owned treatment works (POTW), two generating stations, six oil refineries, 58 minor dischargers, and 62 general permits. Some examples of the types of permitted discharges into the Dominguez Watershed are presented in Table 2.3-7. Industries that hold NPDES discharge permits to the Dominguez Channel are listed in Table 2.3-8.

In addition to the NPDES permits, the Dominguez Watershed has 539 various storm water discharge permits including 424 industrial and 115 construction. Of the 424 industrial storm water permits, most are located in the cities of Gardena, Wilmington, Torrance, and Carson, along the Dominguez Channel. These permits are comprised, in large part, of warehousing, auto wrecking, and metal plating. Of the 115 construction storm water permits, the majority are along the Dominguez Channel, with approximately 25 percent of these construction sites larger than ten acres. The total number of industrial, construction, and NPDES permits varies from year to year, sometimes considerably.

The contribution of pollution from permit holders to the receiving water bodies has the potential to be significant. It is for this reason that the Water Boards require all permittees to monitor their wastewater discharge for the analytes listed within their individual permits. On a periodic basis (i.e., monthly), each permit holder is required to sample their outflow and report all results to the Regional Board. Periodically, the Regional Boards compile all data and, based on the water quality objectives set forth in the Basin Plans, make determinations of the overall water quality of watershed areas. If a water body or section thereof, is found to consistently exceed any of the water quality objectives set forth in the Basin Plan, it is placed on a list of impaired water bodies known as the CWA Section 303(d) list.

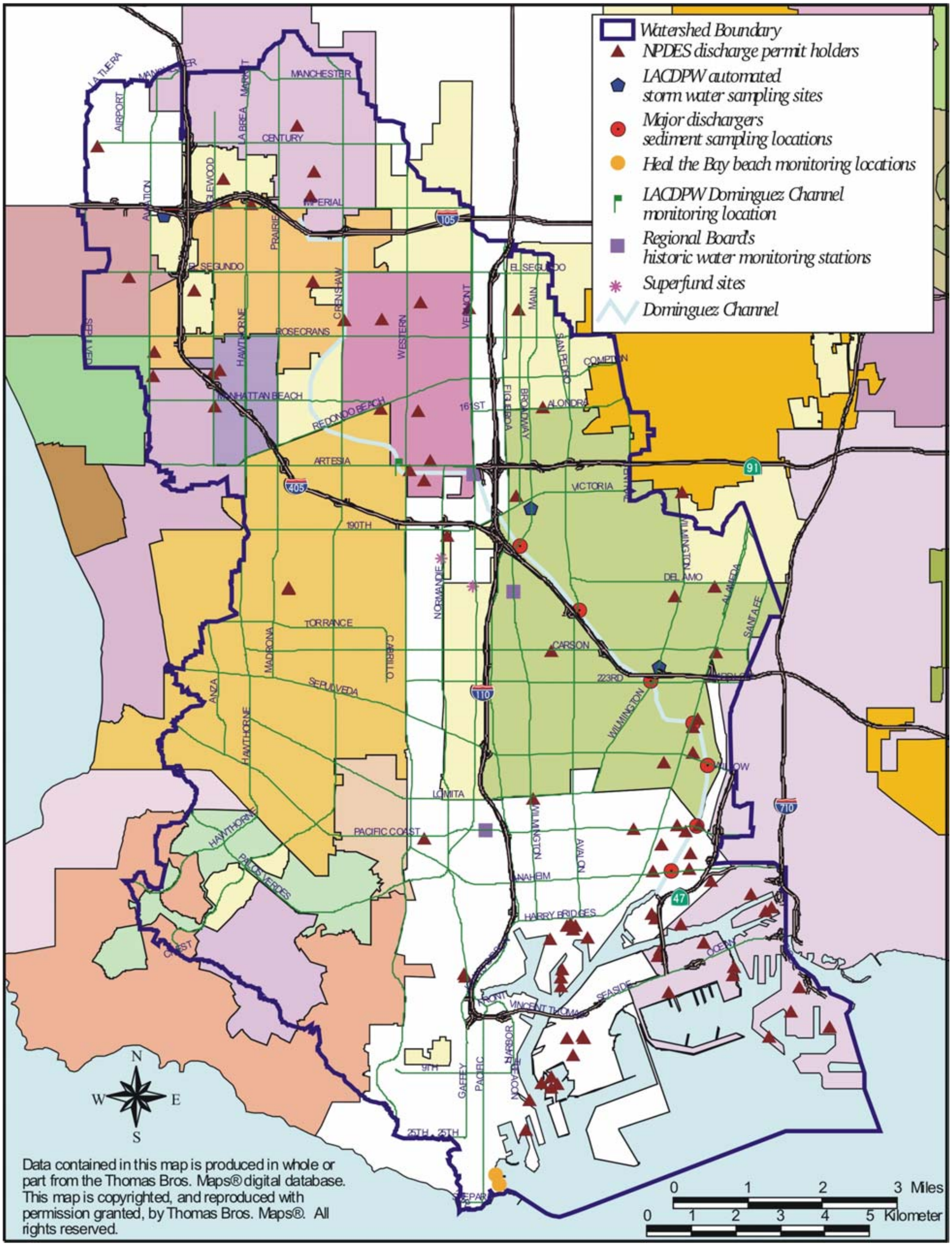


Figure 2.3-1. Major dischargers and sampling locations within the Dominguez Watershed.

Table 2.3-7. Types of permitted wastes discharged into the Dominguez Watershed.

Nature of Waste Prior to Treatment or Disposal	# of Permits	Types of Permits
Nonhazardous (designated) contaminated groundwater	1 4	Major General
Nonhazardous (designated) contact cooling water	2	Minor
Nonhazardous (designated) wastes from dewatering, rec. lake overflow, swimming pool wastes, water ride wastewater, or groundwater seepage	1 6 26	Major Minor General
Nonhazardous (designated) noncontact cooling water	2 4 1	Major Minor General
Nonhazardous (designated) process waste (produced as part of industrial/manufacturing process)	1	Minor
Nonhazardous (designated) stormwater runoff	2 34	Major Minor
Hazardous noncontact cooling water	1	Major
Hazardous contaminated groundwater	6 6	Minor General
Hazardous stormwater runoff	2	Major
Nonhazardous (designated) washwater waste (photo reuse washwater, vegetable washwater)	1	Minor
Nonhazardous (designated) domestic sewage	1	Major
Nonhazardous (designated) filter backwash brine waters	2	Minor
Nonhazardous wastes from dewatering, rec. lake overflow, swimming pool wastes, water ride wastewater, or groundwater seepage	5	General
Nonhazardous filter backwash brine waters	1	General
Nonhazardous contaminated groundwater	1	General
Inert wastes from dewatering, rec. lake overflow, swimming pool wastes, water ride wastewater, or groundwater seepage	14	General

Notes:

Hazardous wastes are those influent or solid wastes that contain toxic, corrosive, ignitable, or reactive substances (prior to treatment or disposal) managed according to applicable Department of Health Services standards.

Designated wastes are those influent or solid wastes that contain nonhazardous wastes (prior to treatment or disposal) that pose a significant threat to water quality because of their high concentrations.

Nonhazardous wastes are those influent or solid wastes that do not contain soluble pollutants or organic wastes (prior to treatment or disposal) and have little adverse impact on water quality.

Inert wastes are those influent or solid wastes that do not contain soluble pollutants or organic wastes (prior to treatment or disposal) and have little adverse impact on water quality. Major discharges are POTWs with a yearly average flow of over 0.5 MGD or an industrial source with a yearly average flow of over 0.1 MGD and those with lesser flows but with acute or potential adverse environmental impacts. Minor discharges are all other discharges that are not categorized as a Major. Minor discharges may be covered by a general permit, which are issued administratively, for those that meet the conditions specified by the particular general permit.

Source: LARWQCB 2001b

Table 2.3-8. Industrial facilities with NPDES waste discharge permits for discharge to Dominguez Channel.

Permit No.	Major Dischargers: Owners	Major Dischargers: Facilities
CA0000680	Arco Petroleum Products Co.	Watson Refinery
CA0000809	Equilon Enterprises LLC	Carson Plant
CA0003778	Equilon Enterprises LLC	Los Angeles Plant (Wilmington)
CA0001333	Heinz Pet Products Div.	Star - Kist Foods Inc.
CA0001171	Long Beach Generation LLC	Long Beach Generation Station
CA0003786	Long Beach Naval Complex	Long Beach Naval Shipyard
CA0053856	Los Angeles, City of, DPW	Terminal Island WWTP
CA0000361	Los Angeles, City of, DWP	Harbor Generating Station
CA0055387	Mobil Oil Corp.	Torrance Refinery, NPDES
CA0063185	Tosco Corp.	L.A.Refinery, Carson Plant
CA0000035	Tosco Corp.	L.A.Refinery, Wilmington Plant
Permit No.	**Other Dischargers: Owners**	**Other Dischargers: Facilities**
CA0063363	AIR PRODUCTS AND CHEMICALS,INC	Hydrogen Plant & Related Fac.
CA0061051	Al Larson Boat Shop	Al Larson Boat Shop
CA0058688	Allied Signal Aerospace	Torrance Facility
CA0059153	Arco C.Q.C. Kiln, Inc.	Arco C.Q.C. Kiln, Inc.
CA0060232	Arco Pipe Line Co.	Carson Crude Oil Terminal
CA0000442	Arco Terminal Services Corp.	Long Beach Marine Terminal 2
CA0000451	Arco Terminal Services Corp.	Long Beach Marine Terminal 3
CA0059285	Arco Terminal Services Corp.	Marine Terminal, Berth 121, Lb
CA0059064	California Sulphur Co.	Sulfur Pelletizing, Wilmington
CA0064211	Churchill Downs California Co.	Hollywood Park
CA0060798	Continental Acrylics, Inc.	Continental Acrylics, Inc.
CA0064165	Dow Chemical Co.	Long Beach Marine Terminal
CA0002941	Edoco	Edoco
CA0062537	Elixir Industries	Tank Leak-Elixir Industries
CA0003557	Equilon Enterprises LLC	Mormon Island Marine Terminal
CA0060631	Fairchild Holding Corp.	Tank Leak-Voi-Shan Redondo Bch
CA0056413	Gardena, City of	Primm Memorial Swimming Pool
CA0001911	GATX Tank Storage Terminals Co	San Pedro Marine Terminal
CA0055816	GATX Tank Storage Terminals Co	Los Angeles Harbor Terminal
CA0056863	GATX Tank Storage Terminals Co	Carson Terminal
CA0060178	GATX Tank Storage Terminals Co	Berth 172, L.A.Marine Terminal
CA0060003	Harbor Cogeneration Company	Harbor Cogeneration Company
CA0059048	Hitco Carbon Composites, Inc	Hitco/Defence Prod Div,
CA0062162	Honeywell Inc.	Tank Leak-Honeywell Inc.
CA0059544	Long Beach, City of	Southeast Resource Recovery
CA0056383	Los Angeles, City of, DWP	Harbor Steam Plant,N Skim Tank
CA0056448	Los Angeles, City of, DWP	Harbor Steam Plant,Skim Pond
CA0057037	Los Angeles, City of, DWP	Harbor G.S. - Marine Tank Farm
CA0057568	Los Angeles, City of, DWP	Olympic Tank Farm Skim Pond
CA0062766	Los Angeles County Parks & Rec	Lennox County Park

Table 2.3-8. (Continued).

Permit No.	Other Dischargers: Owners	Other Dischargers: Facilities
CA0057746	Metropolitan Stevedore Co.	Metropolitan Stevedore Co.
CA0003689	Mobil Oil Corp.	Southwestern Terminal-Area I
CA0060992	Morton International, Inc.	Tank Leak-Bee Chemical Co.
CA0061476	Morton International, Inc.	Morton Salt - Long Beach
CA0059226	Northrop Grumman Corp. Masd	El Segundo Facility
CA0055247	Paktank Corp. - Los Angeles	Petroleum & Chemical Terminal
CA0063177	Paktank Corp. - Los Angeles	Wilmington Liq. Bulk Terminals
CA0059871	Permalite Repro Media Corp.	Permalite Repro Media Corp.
CA0059358	Petro Diamond Terminal Company	Marine Terminal, Berth 83, Lb
CA0063851	Port of Los Angeles	Anaheim St. Viaduct Project
CA0064157	Port of Los Angeles	New Dock Street Pump Statio
CA0001848	Praxair, Inc.	Praxair, Wilmington
CA0058726	Redman Equipment & Mfg Co	Torrance Heat Exchanger Mfg&Rp
CA0058629	Rhodia Inc.	Dominguez Ind Chem Plant
CA0061042	San Pedro Boatworks	San Pedro Boatworks-Berth 44
CA0002798	San Pedro Marine, Inc.	Berth 74, San Pedro
CA0055263	Shore Terminal LLC	Wilmington Marine Terminal
CA0058556	Southern Ca. Marine Institute	Southern Ca. Marine Institute
CA0000868	Southwest Marine, Inc.	Southwest Marine, Inc.
CA0063011	Texaco Exploration & Productio	Cypress Fee Inglewood Gas Plt.
CA0002020	Texaco Refining & Marketing	Carson Sulfur Recovery Plant
CA0001813	Tidelands Oil Production Co.	Wilmington And Terminal Island
CA0059846	Tosco Corp.	Los Angeles Terminal West
CA0000469	Tri-Union Seafoods, LLC	Plant Nos. 1 & 2
CA0063916	TRW Inc.	Hawthorne Site
CA0063924	TRW Inc.	Space Park Facility
CA0055719	Ultramar Inc.	Marine Term, Berth 164
CA0000787	United States Borax & Chem Cor	Wilmington Plant
CA0060496	US Navy Defense Logistics Agen	Defense Fuel Supply Pier 12 Lb
CA0001902	Western Fuel Oil Co.	Western Fuel Oil Co.
CA0002992	Westside Concrete Co.	Greene's Ready-Mixed Concrete
CA0002186	Westway Terminal Company	Westway Terminal-Berths 70-71

Section 303(d) of the 1972 CWA requires states to identify and report all waters not meeting water quality standards. California's most recent 303(d) list was based on the 1998 list and updated in 2002. The listings are based on available data, which may be limited for some areas. The SWRCB and the Regional Boards accepted the updates in 2003 and the list has been submitted to the EPA for approval. The list contains 509 water bodies, many for multiple pollutants. The 303(d) listings for the Dominguez Watershed are listed by area in the Table 2.3-9.

Table 2.3-9. 2002 CWA Section 303(d) list (approved by SWRCB February 4, 2003).

	Dominguez Channel				Los Angeles Harbor										Long Beach Harbor Main Channel, SE, W Basin, Pier J, Breakwater		San Pedro Bay Near and Offshore Zones		Cabrillo Beach (Inner) LA Harbor		Machado Lake (Harbor Park Lake)		Wilmington Drain		Torrance Carson Channel	
	Above Vermont		Vermont to Estuary		Fish Harbor		Consolidated Slip		Inner Breakwater		Main Channel		Southwest Slip													
	Pollutant/ Stressor	TMDL Priority	Pollutant/ Stressor	TMDL Priority	Pollutant/ Stressor	TMDL Priority	Pollutant/ Stressor	TMDL Priority	Pollutant/ Stressor	TMDL Priority	Pollutant/ Stressor	TMDL Priority	Pollutant/ Stressor	TMDL Priority	Pollutant/ Stressor	TMDL Priority	Pollutant/ Stressor	TMDL Priority	Pollutant/ Stressor	TMDL Priority	Pollutant/ Stressor	TMDL Priority	Pollutant/ Stressor	TMDL Priority	Pollutant/ Stressor	TMDL Priority
DDT	X[b]	M	X[b]	M	X	M	X[a,b]	M	X	M	X[a,b]	M	X[a]	M	X[a,d]	M	X[a,b]	M	X[a]	M	X[a,d]	L				
PAHs	X[c]	M	X[c]	M	X	M	X[c]	M	X	M	X[b]	M			X[c]	M	X[c]	M								
PCBs	X[d]	M			X	M	X[a,b]	M	X	M	X[a,b]	M	X[a]	M	X[a,d]	M	X[a]	M	X[a]	M	X[d]	L				
Cadmium							X[c]	L																		
Chlordane	X[d]	M	X[d]	M			X[b]	M													X[a,d]	L				
Chromium	X[c]	M	X[c]	M			X[c]	M									X[c]	L								
Copper	X	M					X[c]	L			X[b]	M					X[c]	L					X	M	X	M
Lead	X[d]	M	X[d]	M			X[c]	M															X	M	X	M
Mercury							X[c]	L																		
Nickel							X[c]	L																		
Toxaphene							X[d]	L																		
Zinc	X[c]	L	X[c]	M			X[c]	L			X[b]	M					X[c]	L								
Aldrin	X[d]	M	X[d]	M																						
Algae																					X	L				
Ammonia	X	M	X	M																	X	L	X	M		
ChemA pesticides*	X[d]	M	X[d]	M																	X[d]	M				
Dieldrin	X[d]	M	X[d]	M			X[d]	L													X[d]	L				
Eutrophic																					X	L				
Odors																					X	L				
Beach Closures											X	H							X	H						
Benthic Community Effects			X	M			X	H (M)							X	M										
High Coliform Count	X	H	X	H																			X	H	X	H
Sediment Toxicity							X	H (M)			X	M	X	M	X	M	X	M								
Trash																					X	M				

* ChemA pesticides refers to the sum of the chemicals aldrin, dieldrin, chlordane, endrin, heptachlor, heptachlor epoxide, HCH lincluding lindane), endosulafan and toxaphene.

[a] Fish Consumption advisory for pollutant/stressor
[b] Elevated levels of pollutant/stressor in tissue and sediment
[c] Elevated levels of pollutant/stressor in sediment
[d] Elevated levels of pollutant/stressor in tissue

H High priority for completing TMDL
M Medium priority for completing TMDL
L Low priority for completing TMDL

Upon establishing the 303(d) list, the affected jurisdictions are required to set priority rankings for the listed water bodies and develop action plans to pursue the water quality objectives. These plans are called Total Maximum Daily Loads (TMDLs). TMDLs are documents that describe a specific water quality attainment strategy for a water body and related impairment identified on the 303(d) list. TMDLs may include more than one water body and/or more than one pollutant. The purpose of the TMDL is to define specific, measurable objectives in order to attain the water quality standards set forth by the beneficial uses for that water body. TMDLs include a description of the total allowable level of the 303(d) listed pollutants and allocation of allowable loads to individual sources or groups of sources, of the pollutants of concern. TMDLs also list the parties to be held responsible for fulfilling the TMDL objectives. Water bodies are ranked by priority for setting TMDL objectives. These rankings are based on water body significance by beneficial use, the degree that water quality standards are not met or beneficial uses are not attained or threatened, and funding availability. Those waters given a high priority are targeted for TMDL completion by 2004, while medium and low priority waters are to be completed after 2004. Some waters given a high priority for high coliform counts have been given a 2003 completion date (i.e., Dominguez Channel, Torrance/Carson Channel, and Wilmington Drain). The priority rankings for the Dominguez Watershed are listed by area in Table 2.3-9.

Many environmental groups have used the TMDL requirements to further their efforts to improve water quality conditions. These groups have launched a series of lawsuits in an effort to make regulatory agencies become more assertive in TMDL developments. TMDL lawsuits are generally filed against the EPA since it is their responsibility to approve TMDLs. Some lawsuits have resulted in consent decrees being supervised by the courts. The Los Angeles region is currently operating under a consent decree. The consent decree is a legal decision and is not variable, unless all parties mutually consent in a written agreement.

All TMDLs listed in the applicable consent decree must be developed within thirteen years (March 2012) from the effective date of the decree (March 1999), with the following three exceptions for the Dominguez Watershed: (1) any TMDLs that are not "Low" priority must be developed within twelve years (March 2011); (2) the TMDLs for beach closures at Los Angeles Harbor (Main Channel, Fish Harbor, and breakwater) and Inner Cabrillo Beach must be developed within five years (March 2004); and (3) the agreed upon minimum progress TMDLs must be completed.

The consent decree has a minimum pace requirement for the number of TMDLs that must be completed and approved by the EPA every year, for the twelve years after March 1999. The minimum pace is one TMDL for the first year, three TMDLs for the second year, five TMDLs for the third year through the tenth year, nine TMDLs for the eleventh year, and five TMDLs for the twelfth year. This pace accounts for only a portion of the TMDLs to be completed in the twelve years and leaves a large number of TMDLs that could be developed in the thirteenth year. In order to ensure the completion of all TMDLs in thirteen years, the LARWQCB and others have developed more intense schedules and strategies so that all TMDLs can be completed during the thirteen-year period.

The LARWQCB's Watershed Management Initiative Chapter was originally issued in December 2001 and includes a schedule of TMDL monitoring start dates. This list is to be updated annually and thus may not be the most current schedule. Another document controlling the planning of TMDLs is the "Draft Strategy for Developing TMDLs and Attaining Water Quality Standards in the Los Angeles Region"; this document was issued by the SWRCB, EPA, and the LARWQCB. The Draft Strategy is expected to further define the Dominguez Watershed TMDL development and planning schedule. The Draft Strategy proposes that certain pollutant TMDLs be grouped together. For the Dominguez Channel it proposes that metals, organics, and other pollutant TMDLs be developed in 2007 and that the nutrient TMDL be developed in 2010. It also proposes that for Los Angeles Harbor and the Dominguez Estuary that all pollutant TMDLs be developed in 2007 (not including nutrients). The exceptions to these propositions is that the bacteria TMDL for Dominguez Channel would be completed in 2003 and the bacteria TMDL for Los Angeles Harbor would be completed in 2005. The final strategy document has not been issued yet, but is expected this summer.

Once a TMDL is developed and approved by the EPA, typically, local jurisdictions are required to develop a "Monitoring Plan" and a "Compliance Plan". If the SWRCB proposes a TMDL and the EPA approves it, compliance deadlines are included in the TMDL. Typically these deadlines are three-years, six-years, ten-years, or eighteen-years, depending on the pollutant, water body, and the compliance approach. Jurisdictions can review and comment on the proposed TMDLs, which may have some influence on their compliance responsibilities. If the SWRCB misses a TMDL development deadline listed in the consent decree, the EPA must issue the TMDL. In this case the TMDL is not expected to include a compliance schedule. If the EPA issues the TMDL, jurisdictions are immediately out of compliance and could be open to environmental lawsuits and other enforcement actions.

In 1989, the California State legislature established the BPTCP. One of the BPTCP's primary roles is the monitoring and assessment of sediments in bays and estuaries. In 1992 the LARWQCB began BPTCP sediment monitoring in the Los Angeles Region. Monitoring began in Los Angeles and Long Beach Harbors as part of a three-year agreement between NOAA and the SWRCB (SWRCB 1998).

The California Water Code, Division 7, Chapter 5.6, Section 13390, mandates the SWRCB and the LARWQCB to provide the maximum protection of existing and beneficial uses of bays and estuarine waters and to plan for remedial actions at those identified toxic hot spots where beneficial uses are being threatened by toxic pollutants (SWRCB 1998).

The BPTCP has four major goals: provide protection of present and future beneficial uses on bays and estuarine waters, identify and characterize toxic hot spots, plan for toxic hot spot cleanup or other remedial or mitigation activities, and develop prevention and control strategies for toxic pollutants that will prevent the development of new toxic hot spots (SWRCB 1998).

On October 12, 1997, Governor Wilson signed into law SB 673, which required the Commission and the LARWQCB to establish the multi-agency Contaminated Sediments Task Force (CSTF). It also requires the Commission and the Board to actively participate in the CSTF and assist in the preparation of a long-term management plan for dredging and disposal of contaminated sediments in the Los Angeles area. The management plan will consider aquatic and upland disposal alternatives, treatment, beneficial re-use, and other management techniques. The plan will include a component focused on the reduction of contaminants at their source. The CSTF includes representatives from the U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, California Coastal Commission, LARWQCB, California Department of Fish and Game, Port of Long Beach, Port of Los Angeles, City of Long Beach, Los Angeles County Beaches and Harbors, Heal the Bay, and other interested parties.

2.3.2 Surface Hydrology and Hydraulics

2.3.2.1 Overview

The Dominguez Watershed drains an area of approximately 345 square kilometers (133 square miles) in southwestern Los Angeles County, California. The watershed drains all or portions of the cities of Carson, Compton, El Segundo, Gardena, Hawthorne, Inglewood, Lawndale, Lomita, Long Beach, Los Angeles, Manhattan Beach, Palos Verdes Estates, Rancho Palos Verdes, Redondo Beach, Rolling Hills, Rolling Hills Estates, and Torrance.

The watershed, shown in Figure 2.3-2 and summarized in Table 2.3-10, is comprised of five subwatersheds. Two of the subwatersheds, Upper Channel and Lower Channel, drain a combined area of approximately 186 square kilometers (72 square miles) directly into the Dominguez Channel. The remaining subwatersheds drain into retention basins for groundwater recharge, into Machado Lake, or directly into the Los Angeles and Long Beach Harbors.

Table 2.3-10. Subwatersheds of the Dominguez Watershed.

Subwatershed	Subwatershed Area (Square Kilometers)	Subwatershed Area (Square Miles)
Upper Channel	97.1	37.5
Lower Channel	88.8	34.3
Dominguez Channel Subtotal	185.9	71.8
Retention Basins	3.6	1.4
Walteria Retention Basin	9.1	3.5
Machado Lake	50.6	19.5
Harbors	95.0	36.7
Non-Dominguez Channel Subtotal	159.2	61.1
TOTAL	345	133

Since virtually the entire watershed is highly urban, drainage within the Dominguez Watershed is primarily conducted through an extensive network of underground storm drains (Figure 2.3-3). These drains generally originate at curb inlets on city streets and increase in size as they progress in the downstream direction to an open channel or detention basin. In some locations the drainage system is no longer adequate, and localized flooding occurs. Areas where there are known drainage concerns are indicated on Figure 2.3-3. Because most of the watershed drainage is urbanized, an extensive amount of trash is conveyed to the drainageways.

Dominguez Channel

The Dominguez Channel, draining approximately 62 percent of the Dominguez Watershed, is the largest single drainage feature within the watershed. The channel begins at 116th Street in the City of Hawthorne, and continues in a generally southwesterly direction, passing through the cities of Hawthorne, Gardena, Torrance, Carson, and Los Angeles to empty into the Consolidated Slip of Los Angeles Harbor near the intersection of Henry Ford Avenue and Anaheim Street. Approximately 42 percent of the 24-kilometer (15-mile) channel is in the City of Carson.

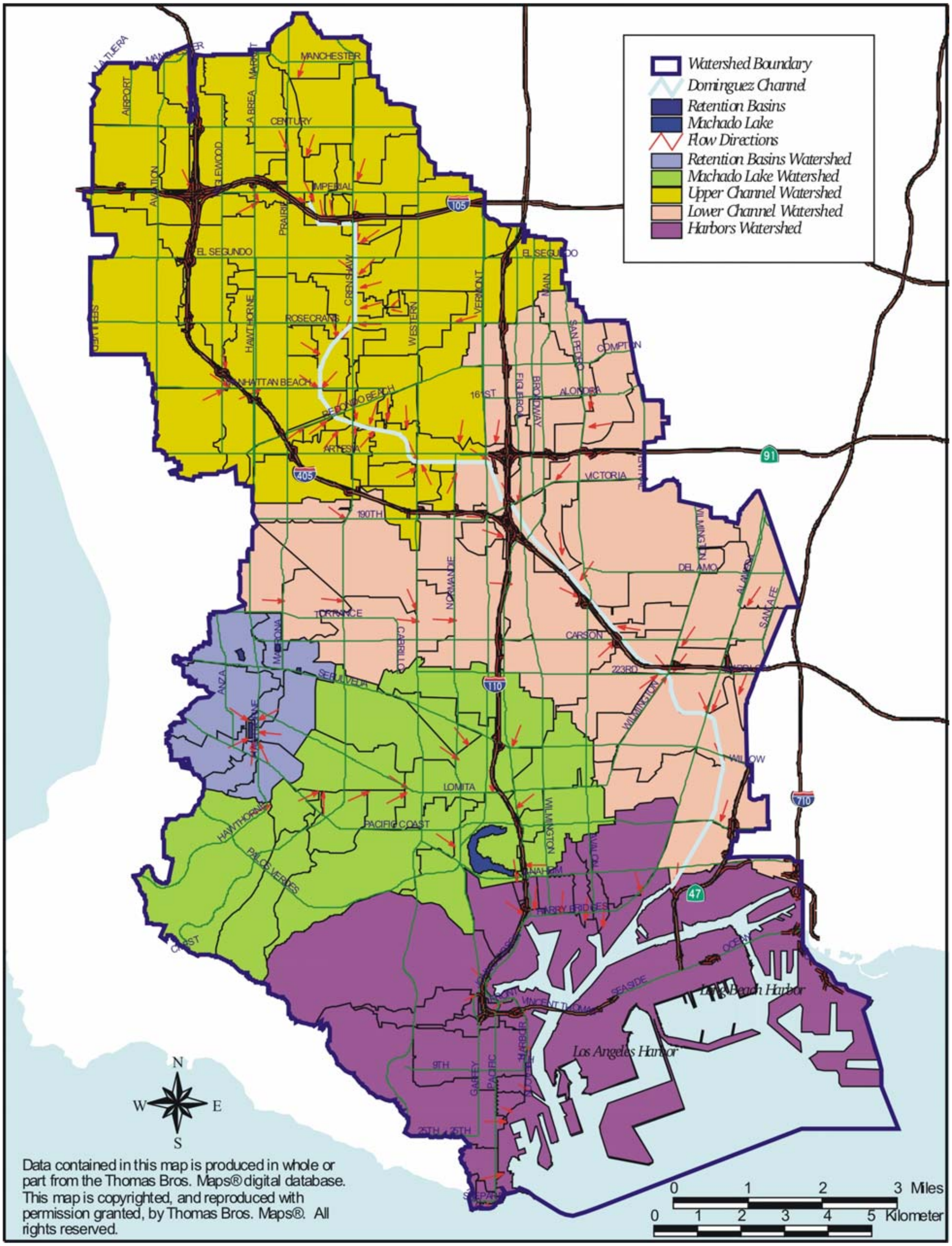


Figure 2.3-2. Subwatersheds within the Dominguez Watershed.

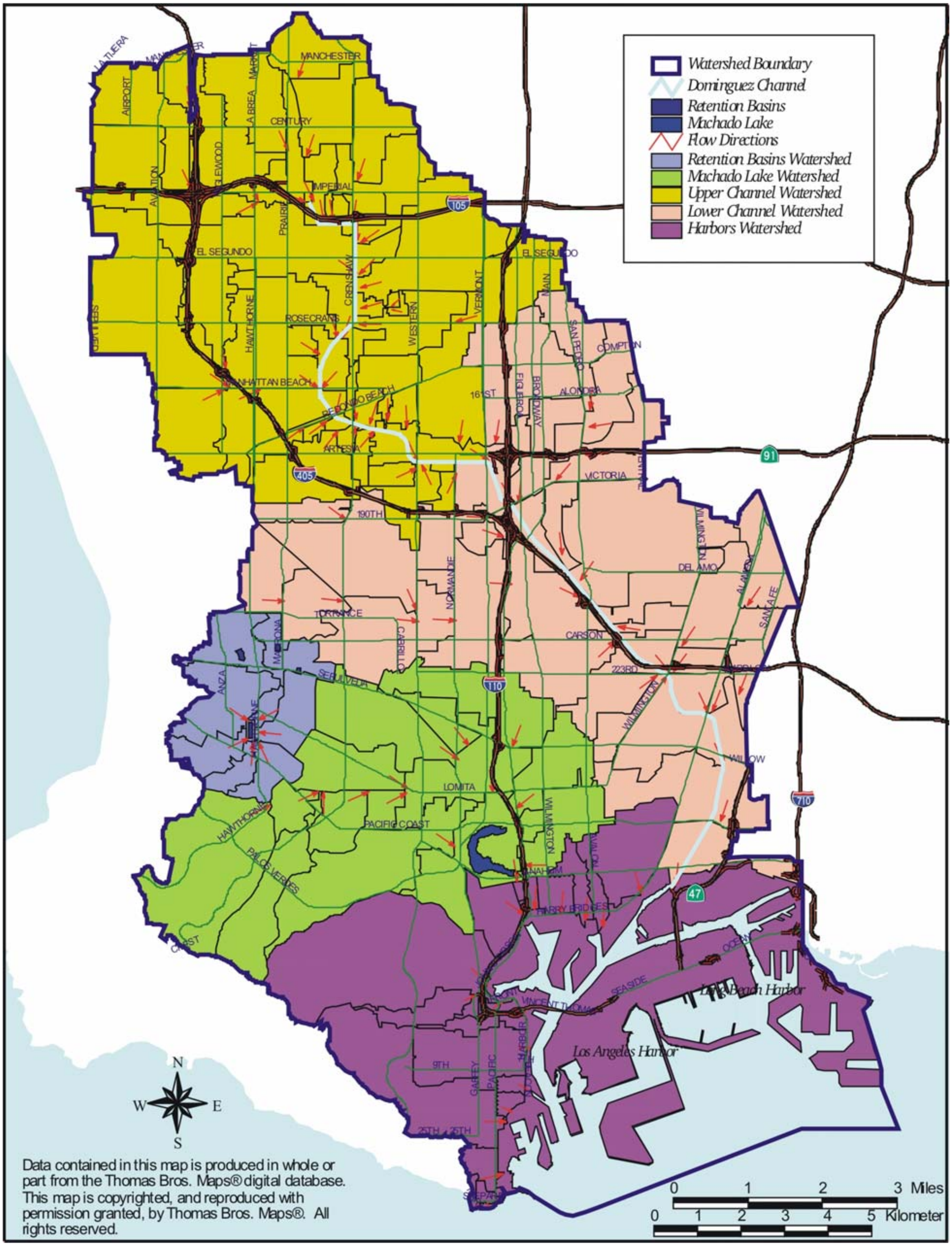


Figure 2.3-2. Subwatersheds within the Dominguez Watershed.

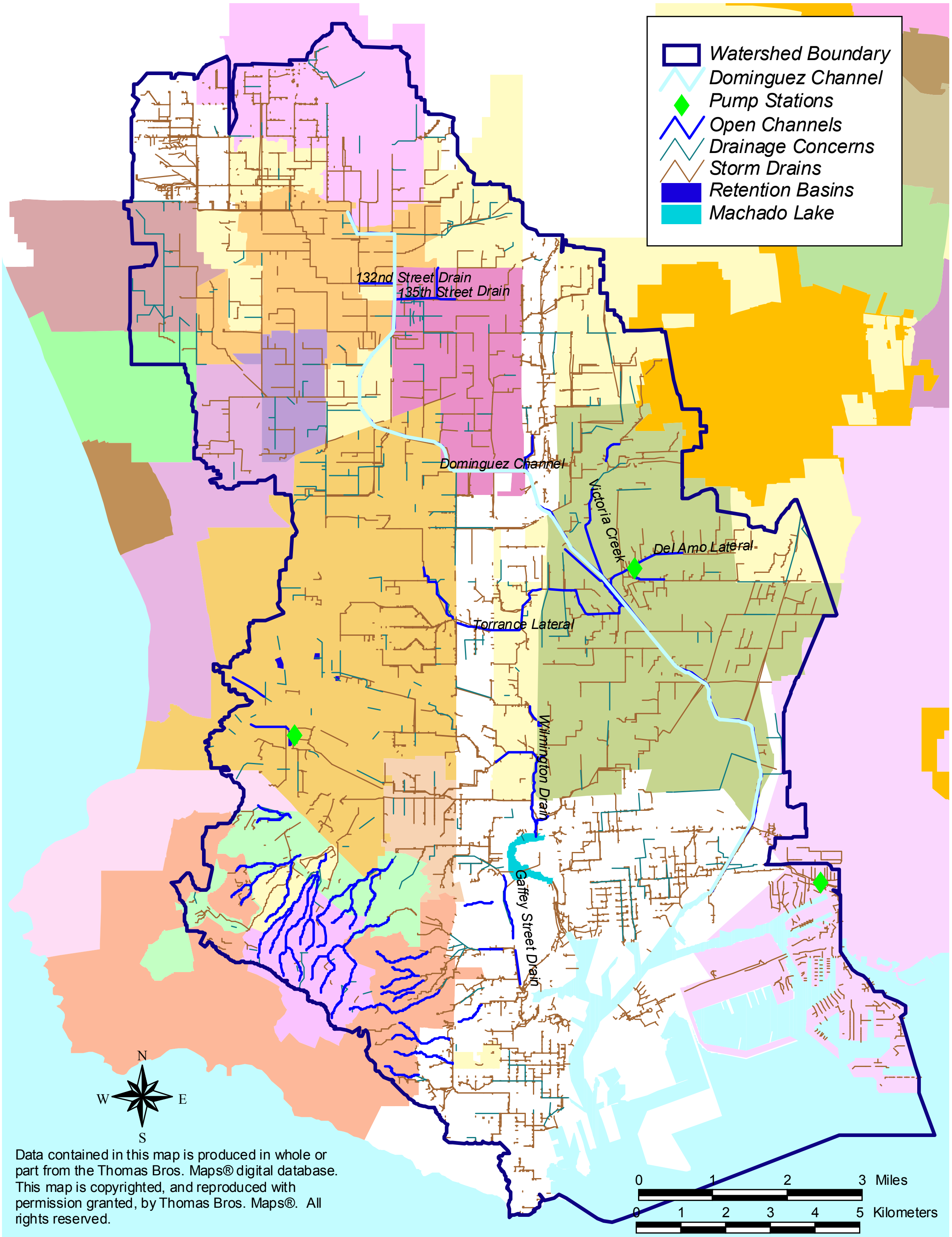


Figure 2.3-3. Storm drains, open channels, retention basins, and receiving waters within the Dominguez Watershed.

Table 2.3-11 summarizes the channel depth and width characteristics for the Dominguez Channel Subwatersheds.

Table 2.3-11. Dominguez Channel design flow rates and channel characteristics.

Location	Design Discharge, in cms (cfs)	Shape of Channel	Channel Side Slopes	Bottom Width, in Meters (feet)	Channel Depth, in Meters (feet)	Design Flow Depth, in Meters (feet)	Design Flow Velocity, in Meters per Second (feet per second)
116th St., Hawthorne	207 (9,539)	Rectangular	Vertical	22.6 (74.1)	3.2 (10.5)	2.8 (9.2)	3.3 (10.8)
Lemoli St., Hawthorne	300 (10,599)	Rectangular	Vertical	27.4 (89.9)	3.9 (12.7)	3.4 (11.2)	3.2 (10.5)
Alondra Park, Los Angeles	400 (14,132)	Rectangular	Vertical	25.9 (85.9)	3.7 (12.1)	3.1 (10.5)	4.9 (16.1)
Western Avenue, Gardena	406 (14,343)	Rectangular	Vertical	25.9 (85.9)	3.7 (12.1)	3.2 (10.5)	5.0 (16.4)
Vermont Ave., Los Angeles	412 (14,555)	Trapezoidal	2:1	30.5 (100.1)	6.3 (20.7)	6.0 (19.7)	1.6 (5.3)
Del Amo Blvd, Carson	461 16,287)	Trapezoidal	2:1	30.5 (100.1)	6.8 (22.3)	6.4 (21.0)	1.7 (5.6)
Carson St., Carson	469 (16,569)	Trapezoidal	2:1	30.5 (100.1)	6.8 (22.3)	6.4 (21.0)	1.7 (5.6)

cms = centimeters per second
cfs = feet per second

The following is a brief description of the major channel features:

Upper Dominguez Channel

116th Street to Manhattan Beach Boulevard (5.6 kilometers [3.5 miles]). The Dominguez Channel in this reach is within the Upper Dominguez portion of the watershed. The channel is constructed of reinforced concrete with vertical sides and a flat bottom 22.6 to 27.4 meters (74 to 90 feet) wide. There is a maintenance access road on both sides (usually paved on one side and gravel on the other side). Adjacent land is mainly residential with some industrial and commercial uses. There is very little undeveloped land adjacent to the channel. Figure 2.3-4 shows typical views of the channel in this reach.

Manhattan Beach Boulevard to Vermont Avenue (5.2 kilometers [3.2 miles]). The Dominguez Channel in this reach is within the Upper Dominguez portion of the watershed. The channel is constructed entirely of reinforced concrete with vertical sides. The channel bottom is 25.9 meters (85 feet) wide and flat with a trapezoidal low-flow channel in the middle. There is a maintenance access road on both sides (usually paved on one side and gravel on the other side). Adjacent land is a mixture of residential, industrial and commercial uses. This reach of the channel passes through Alondra Park. With the exception of an undeveloped parcel on the north side of the channel between Western Avenue and Normandie, there is little undeveloped land adjacent to the channel. Figure 2.3-5 shows typical views of the channel in this reach.

Lower Dominguez Channel

Vermont Avenue to Los Angeles Harbor (13.4 kilometers (8.3 miles)). The Dominguez Channel in this reach is within the Lower Dominguez portion of the watershed. At Vermont Avenue the Dominguez Channel changes from a vertical-sided concrete channel to a trapezoidal channel with 2:1 side slopes. The channel bed is compacted clay. The sides are grouted riprap. There is a paved maintenance access road on both sides. Adjacent land is mainly a mixture of open space, utilities and industrial uses. There is some residential use upstream of the 405 Freeway. Downstream of the 405 Freeway the adjacent uses are all industrial with oil production facilities predominating. This reach of the channel is subject to tidal flows. Figures 2.3-6 and 2.3-7 show typical views of the channel in this reach.

View looking upstream at beginning of Dominguez Channel at 116th Street. Note trash debris line from previous flow.

View looking downstream in the vicinity of El Segundo Street

Figure 2.3-4. Typical views of the Upper Dominguez Channel Subwatershed between 116th Street and Manhattan Beach Boulevard.

View looking upstream near Manhattan Beach Boulevard. A trapezoidal low-flow channel begins here.

View looking downstream between Western Avenue and Normandie.

Figure 2.3-5. Typical views of the Upper Dominguez Channel Subwatershed between Manhattan Beach Boulevard and Vermont Avenue.

View looking downstream from Vermont Avenue.

View looking downstream between Main Street and Avalon Boulevard. Note trash debris line.

Figure 2.3-6. Typical views of the Lower Dominguez Channel Subwatershed between Vermont Avenue and the 405 Freeway.

View looking downstream from 223rd Street.

View looking downstream from 223rd Street.
Note the trash debris line

Figure 2.3-7. Typical views of the Lower Dominguez Channel Subwatershed between the 405 Freeway and Los Angeles Harbor.

Machado Lake

Approximately 50.6 square kilometers (19.5 square miles) of the Dominguez Watershed, including Lomita and portions of Rolling Hills, Rolling Hills Estates, Torrance, and the City of Los Angeles, drains to Machado Lake near the intersection of Vermont Avenue and Anaheim Street in the City of Los Angeles. The main drain within this watershed is the Wilmington Drain. The Wilmington Drain runs for approximately 2.9 kilometers (1.8 miles) north of Machado Lake. Upstream of the Harbor Freeway, for a distance of approximately 1.6 kilometers (one mile), the Wilmington Drain is a concrete-lined channel with vertical sides similar to the Dominguez Channel upstream of Manhattan Beach Boulevard. Downstream of the Harbor Freeway, the Wilmington Drain is in an unlined channel that appears to be in a relatively natural condition with extensive vegetation along the sides. At Pacific Coast Highway, the channel has an adverse grade which occasionally requires pumping to move low-flows from one side of the highway to the other and into Machado Lake. Figure 2.3-8 shows typical views of the Wilmington Drain.

Much of the Machado Lake Subwatershed consists of the hilly regions of Rolling Hills and Rolling Hills Estates. This portion of the watershed is unique for Dominguez by consisting of relatively steep hills with drainageways in canyons. These drainageways flow generally northwest from the hills toward Machado Lake.

Retention Basins

The Walteria Lake Retention basin near the intersection of Lomita Boulevard and Hawthorne Boulevard in the City of Torrance, collects runoff from a watershed approximately 9.1 square kilometers (3.5 square miles) in area, mostly within the City of Torrance. The retention basin is approximately 91 meters (300 feet) wide and 366 meters (1,200 feet) long, and fed by underground storm drains. The basin is terraced with vegetated sides. Being a retention basin, flows that enter do not leave except by infiltration or evaporation. The surrounding land use is residential. Figure 2.3-9 shows a typical view of the Walteria Lake retention basin. Photographs of other retention and detention basins are in Section 2.4.2.6.

Approximately 3.6 square kilometers (1.4 square miles) of the Dominguez Watershed, mostly in the City of Torrance, drains to local retention basins similar to, but much smaller than, the Walteria Retention basin.

Harbors

The Harbors Subwatershed, drains approximately 95 square kilometers (36.7 square miles) in the lower portion of the Dominguez Watershed. The Harbor Subwatershed drains directly into the Los Angeles and Long Beach Harbors, and comprises portions of the cities of Los Angeles, Long Beach, Rancho Palos Verdes, and Rolling Hills. The main open channel drainageway is the Gaffey Street Drain, which runs parallel to Gaffey Street south of Machado Lake in the City of Los Angeles. Figure 2.3-9 shows a representative view of the Harbors Subwatershed. Photographs of other locations within the Harbors Subwatershed are in Section 2.4.2.3.

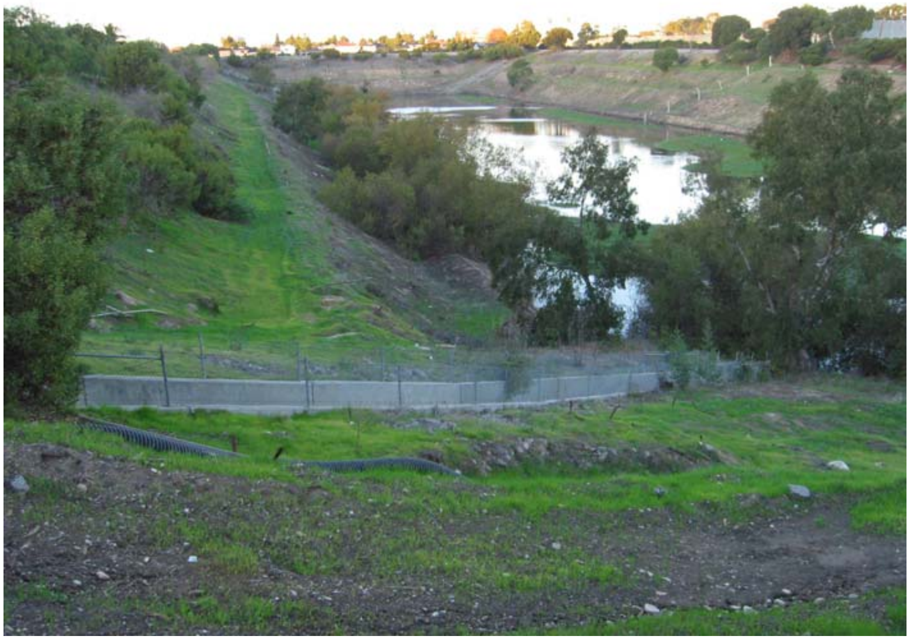
The Rolling Hills area, comprised of Rancho Palos Verdes, Rolling Hills, and Rolling Hills Estates, represents the highest elevations on the watershed. Ground elevations range up to 455 meters (1,500 feet), as compared to approximately 20 meters (65 feet) ground elevation at the beginning of the Dominguez Channel. The Rolling Hills topography is hilly, with steep canyons and narrow, steep drainageways, many of which are in a relatively natural condition. This area drains mainly into the Harbor Subwatershed and the Gaffey Street Drain, but also into the Machado Lake and Retention Basins Subwatersheds.

View of Wilmington Drain looking upstream from Lomita Boulevard. Note trash boom.

View of Wilmington Drain upstream of the Harbor Freeway.

View of Machado Lake.

Figure 2.3-8. Typical views of the Machado Lake Subwatershed.


View of Walteria Lake Retention Basin looking north from the south end of the basin.


View of Consolidated Slip in Los Angeles Harbor.

Figure 2.3-9. Typical views of the Retention Basins and Harbors Subwatersheds.

2.3.2.2 Hydrology

Stream flow in southern California generally corresponds to rainfall events. Since rainfall occurs almost exclusively in the winter, the streams are typically dry in the summer months. Since the watershed is entirely urban, and most drainage channels are fully lined, rainfall-induced runoff would occur with a similar seasonal pattern. As mentioned in Section 2.1, the watershed receives an average of 30.7 centimeters (12.1 inches) of rain per year, with only 1.4 centimeters (0.55 inches) of that in summer.

However, the Dominguez Watershed has dry-season flows from man-made sources. Based on survey information from the watershed cities (see Section 2.3.2.4 of this report), dry season flow has been observed by the Los Angeles County Department of Public Works, and the cities of Torrance, Gardena, Carson, Manhattan Beach, Lomita and Hawthorne. The causes are described as permitted (NPDES) discharges, urban runoff from irrigation, and other sources such as car washing and swimming pool discharges. Based on information provided by Los Angeles County, there are over 100 permitted dischargers to the Dominguez Channel alone. Total permitted discharge is approximately 5.4 cubic meters per second (cms) (190 cubic feet per second (cfs)).

Field observations during the winter of 2003, one day after a rainfall-related runoff event, revealed relatively large discharges entering the Dominguez Channel at 118th Street and at Manhattan Beach Boulevard. The Los Angeles County Department of Public Works stated that these discharges occur year-round. Los Angeles County maintains a stream gage on the Dominguez Channel at Artesia Boulevard. Table 2.3-12 provides average dry-season flows for a recent season. As can be seen from the table, dry-season flows were relatively high, ranging from 0.9 to 1.4 cms (32 to 49 cfs).

Table 2.3-12. Dominguez Channel dry-season flow rates at Artesia Boulevard.

Month	Year 2002 Dry-Season Flow, in cms (cfs)
May	1.2 (42)
June	0.9 (32)
July	1.3 (46)
August	1.4 (49)
September	1.2 (42)

Below Vermont Avenue, dry season flows are more difficult to observe for the reason that this reach of the channel is within the tidal zone.

Design discharges on the Dominguez Channel are listed in Table 2.3-11 and range from 207 to 469 cms (7,300 cfs to 16,570 cfs). Discharges of this magnitude are rare events, generally occurring with less frequency than once every fifty years on average, which was used to design the channel for flood control.

2.3.2.3 Hydraulics/Flooding

Table 2.3-11 shows that the Dominguez Channel design discharge is contained within the channel, indicating that overbank flooding from the channel does not occur except on very rare events that exceed the design discharge. Design flow velocities above Vermont Avenue range from 3.2 to 5.0 meters (10.5 to 16.3 feet) per second. Depths range from 2.8 to 3.4 meters (9.2 to 11.3 feet). Below Vermont Avenue, as a result of the changed channel characteristics, the flow velocities decrease to approximately 1.7 meters (5.6 feet) per second. Depths are greater than 6.1 meters (20 feet).

Figure 2.3-10 shows the Federal Emergency Management Agency flood zones for the Dominguez Watershed. Table 2.3-13 lists the flood zone definitions for Figure 2.3-10. With very minor exceptions, none of the flood zones are along the main channels, indicating that overbank flooding from the channels does not occur, as is indicated by the information in Table 2.3-11. Although the main channel serves effectively as flood control, there are some local areas subject to flooding from drainage originating outside the channels. The largest single area of flooding is an AE zone at Long Beach Harbor. AE zones are associated with coastal flooding from the ocean. Other relatively large flood areas are AR zones (associated with inadequate Federal levees) along the eastern watershed boundary. All of the other flood-prone areas are small and localized, many of which are associated with low areas or sumps.

Table 2.3-13. Federal Emergency Management Agency flood zone definitions.

Flood Zone	Flood Zone Definition
A	Area inundated by 100 year flooding, for which no base flood elevations have been established.
A2 A8 A9	Area inundated by 100 year flooding, for which no base flood elevations have been established.
AE	Area inundated by 100-year flooding, for which Base flood elevations have been determined.
AH	Area inundated by 100-year flooding (usually an area of ponding), for which base flood elevations have been determined; flood depths range from 1 to 3 feet.
AR	Area inundated by flooding, for which base flood elevations or average depths have been determined.
AR/A	Area inundated by flooding, for which base flood elevations or average depths have not been determined.
B	Area inundated by 500-year flooding; an area inundated by 100-year flooding with average depths of less than 1 foot or with drainage areas less than 1 square mile; or an area protected by levees from 100-year flooding.
V9	Area inundated by 100-year flooding with velocity hazard (wave action); no base flood elevations have been determined.
X	Area that is determined to be outside the 100- and 500-year floodplains.

Los Angeles County and the cities of Torrance, Gardena, Carson, Manhattan Beach and Lomita all reported having flood problems (see Section 2.3.2.4 of this report). As an example, the City of Torrance produced a flooding "Hot Spot" map (Figure 2.3-11). The flood "Hot Spot" map indicates numerous areas of observed flooding, most of which appear to be associated with streets. It is likely this is typical of the Dominguez Watershed and most of the observed flooding occurs in areas outside the main channels where the local drainage system, which consists of an extensive network of underground storm drains (Figure 2.3-3), is inadequate. An occurrence of this type of flooding was observed at Alondra Park during a field visit in the winter of 2003, one day after a rainfall event (Figure 2.3-12).

Although not mapped in Figure 2.3-10, Los Angeles County reports that flooding also occurs along the Gaffey Street Drain in Los Angeles south of Machado Lake. This drain is apparently undersized and overflows onto Gaffey Street during large runoff events.

2.3.2.4 Drainage Perceptions and Practices Within the Watershed

Cities and other jurisdictions in and associated with the Dominguez Watershed were queried regarding drainage conditions, drainage needs, and drainage goals for the watershed plan. Los Angeles County, eight cities, the RWQCB, and the Port of Long Beach, responded. The results are presented in Tables 2.3-14 to 2.3-20.

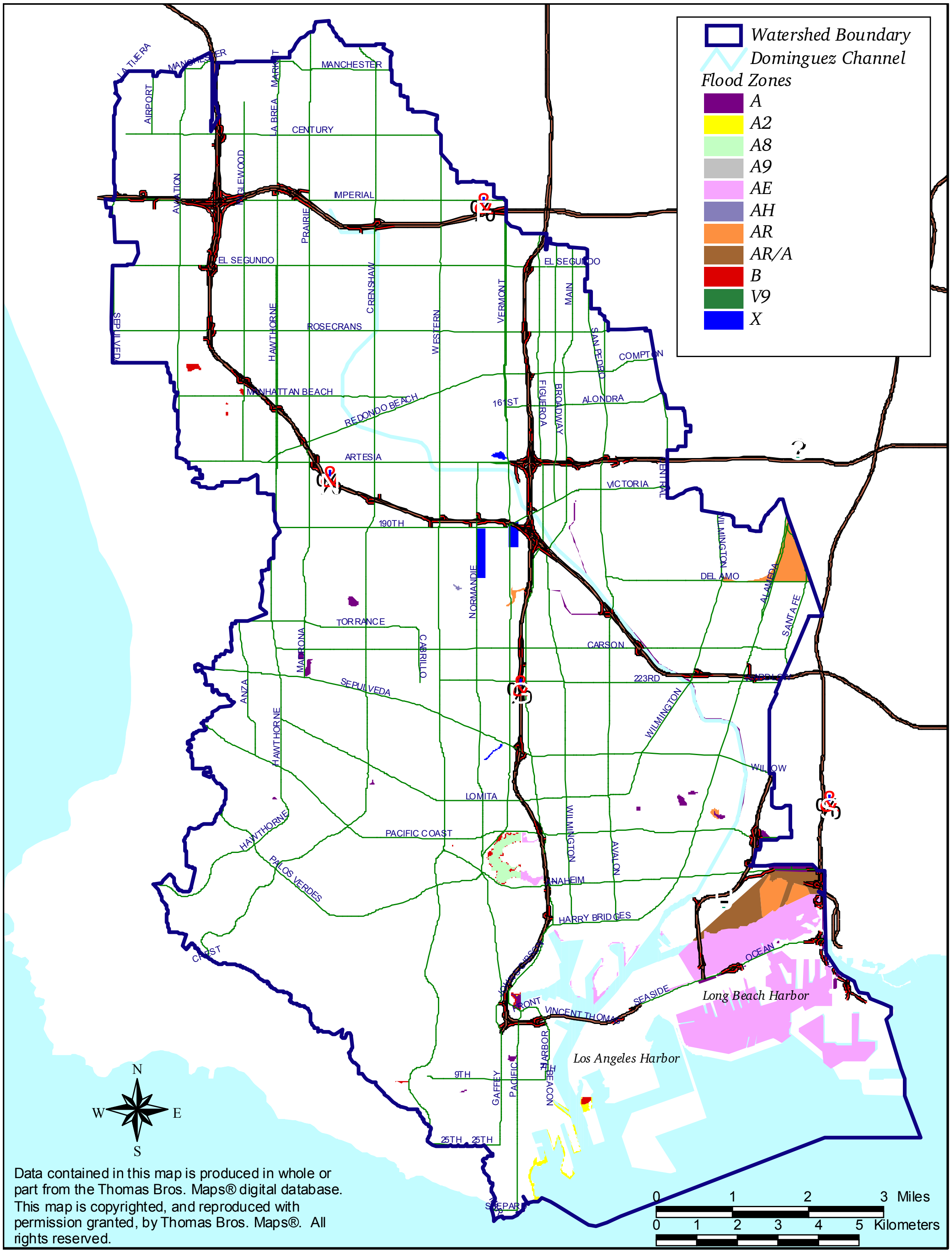


Figure 2.3-10. Federal Emergency Management Agency flood hazard zones within the Dominguez Watershed.

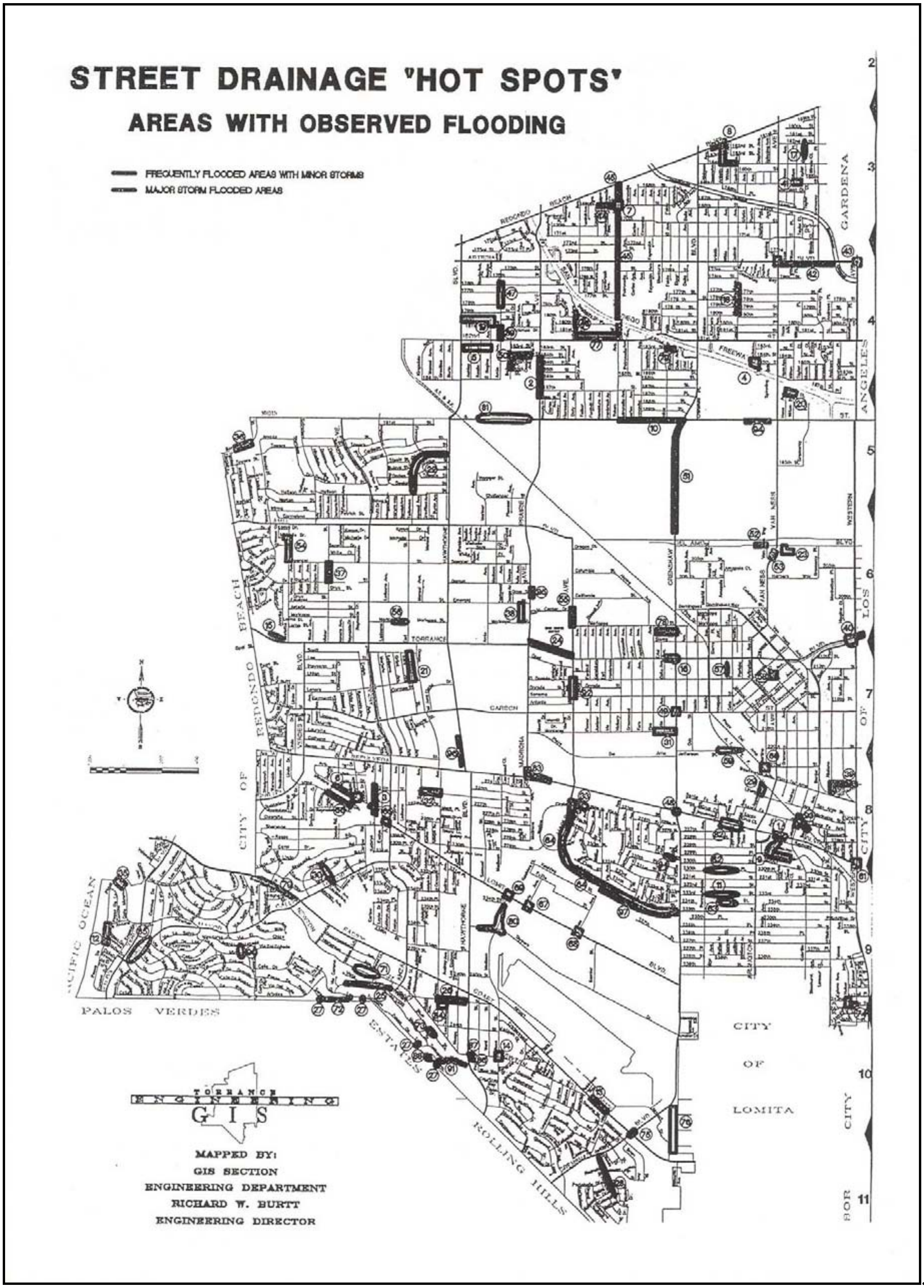


Figure 2.3-11. City of Torrance drainage "Hot Spot" map.

Figure 2.3-12. Flooding near Alondra Park, December 2002.

Table 2.3-14. Drainage questionnaire results.

	Open Drainage Channels	Flood Problems	Solutions to Flood Problems	Dry Season Low Flow	Monitoring of Flow Rates	Watershed Requirements for New Development	Drainage Projects in Next Two Years	Drainage Goals for Dominguez Watershed Plan
LOS ANGELES COUNTY								
Los Angeles County Department of Public Works	Y	Y	Y	Y	Y	Y	Y	Y
CITIES								
City of Torrance	Y	Y	Y	Y	N	Y	N	N
City of Gardena	Y	Y	N	Y	N	Y	N	Y
City of Carson	Y	Y	Y	Y	N	Y	Y	N
City of Manhattan Beach	N	Y	Y	Y	N	Y	N	N
City of Lomita	N	Y		Y	N	Y	N	N
City of Long Beach	N	N			N	Y	N	N
City of Hawthorne	Y			Y	N	Y		
City of Inglewood	N	N		N	N	Y	N	Y
City of Los Angeles (Department of Parks and Recreation)	Y	Y			N	Y	N	N
OTHER AGENCIES								
Regional Water Quality Control Board						Y		Y
Port of Long Beach	N	N			N	N	N	N

Notes:
Y = Yes, N = No.
Blank square means did not answer or not applicable.

Table 2.3-15. Solutions to drainage problems.

Planned	
Los Angeles County Department of Public Works	Storm Drains
City of Torrance	Walteria Drain and Mondore Drain in Palos Verdes
City of Carson	Dominger Pump Station at Janison/Torrance intersection
City of Manhattan Beach	Concrete swale, curb and gutter
Needed	
Los Angeles County Department of Public Works	Watershed management solutions that incorporate water conservation, recreational opportunities, wildlife corridors, open space, etc.
City of Torrance	See City of Torrance Drainage Hot Spots Map

Table 2.3-16. Drainage projects to be constructed in the next two years.

Los Angeles County Department of Public Works	Walteria Drain in Palos Verdes Hills that will drain into Walteria Lake. Dominger Drain and pump station into Torrance Lateral in Torrance.
City of Carson	Storm Drain – 228th Street and Main Street Intersection.

Table 2.3-17. Watershed requirements for new developers.

	Control Flooding	Prevent Water Quality Degradation	Replenish Groundwater	Other
Los Angeles County				
Los Angeles County Department of Public Works	Y	Y	N	Collected/Captured stormwater must percolate within 7 days. Adequate maintenance of new facilities required.
Cities				
City of Torrance	Y	Y	Y	N
City of Gardena	Y	Y	N	N
City of Carson	Y	Y	N	N
City of Manhattan Beach	N	Y	N	N
City of Lomita	N	Y	N	N
City of Long Beach	N	Y	N	N
City of Hawthorne	N	Y	N	N
City of Inglewood	Y	Y	N	N
City of Los Angeles (Department of Parks and Recreation)	Y	Y	N	N
Other Agencies				
Regional Water Quality Control Board	N	Y	N	Protect existing and beneficial uses of waters. Improve water quality.

Notes:
Y = Yes, N = No.

Table 2.3-18. Current maintenance practices of drainage channels within the Dominguez Watershed.

Jurisdiction	Percent Maintained by Jurisdiction	Type of Maintenance
Los Angeles County		
Los Angeles County Department of Public Works	100%	• Removal of excess sediment from concrete-lined channels and removal of excess vegetation from natural channels once/year. • Clearing trash from channel and access roads between 120th Street and Vermont Avenue (once per week). • Regular storm drain inspections to check for illicit connections. • Catch basin cleaning (1, 2 and 4 times per year depending upon catch basin).
Cities		
City of Torrance	60%	Trash, debris and vegetation clearing from open channels and sumps.
City of Gardena	0%	Clean debris and weeds occasionally.
City of Carson	0%	County does all maintenance.
City of Hawthorne	0%	County does all maintenance.

Table 2.3-19. Current maintenance costs of channels within the Dominguez Watershed.

Jurisdiction	Annual Cost or Percentage of Total Maintenance				
	Erosion	Sedimentation	Flooding	Channel Clogging/Storm Drain Backup	Exotic Vegetation Removal
Los Angeles County Department of Public Works	0	0	Dominguez Channel = $211,000 Wilmington Drain = $262,000 Torrance Lateral = $25,000 Total = $498,000		
City of Torrance	$10,000	$15,000	$20,000	$50,000	$60,000
City of Carson	0	$3,000	$5,000	0	0
City of Lomita	0	0	10%	10%	
Port of Long Beach	0	0	0	30%	0

Table 2.3-20. Sources of dry season flow.

Los Angeles County	
Los Angeles County Department of Public Works	Permitted discharges and urban runoff from irrigation.
Cities	
City of Torrance	• Flushing of potable water distribution system. • Reclaimed and potable landscape irrigation runoff. • Drains for foundations, footings and crawl spaces. • Air conditioning condensation. • Swimming pool discharges. • Dewatering of decorative fountains and lakes. • Non-commercial car washing. • Sidewalk rinsing.
City of Gardena	Dry season flow only on County channel. Source unknown.
City of Carson	Primarily landscape irrigation runoff.
City of Manhattan Beach	Residential irrigation runoff, car washing, etc.
City of Lomita	Landscape irrigation and water system discharges.
City of Hawthorne	Urban runoff and possibly NPDES point source discharges.

Three of the cities, Manhattan Beach, Lomita and Long Beach, have no open drainage channels within the Dominguez watershed. All but Long Beach, Hawthorne, and Inglewood reported experiencing flood problems. Only three of the cities, plus Los Angeles County, are working on solutions to the flood problems, but only one, plus the County, have drainage projects planned for the next two years. Planned solutions (Tables 2.3-15 and 2.3-16) are all storm drains intended to relieve local flooding of the kind described in Section 2.3.2.2 of this report.

All respondents have watershed requirements for new developers. Requirements (Table 2.3-17) primarily consist of prevention of water quality degradation. The City of Torrance has requirements for the replenishment of groundwater. About half of the respondents require new development to control flooding.

Los Angeles County, five cities, and the Port of Long Beach reported performing drainage maintenance (Tables 2.3-18 and 2.3-19). The majority of maintenance is by the County. Maintenance typically consists of trash removal, clearing of vegetation, and removal of sediment from concrete channels. One source of sediment to the channels is the sloping earth immediately adjacent to the channel maintenance access roads. The earth is washed across the maintenance roads and directly into the channel during rainfall events. The reach of the Dominguez Channel between Rosecrans Avenue and Vermont Avenue is particularly subject to this problem, which is illustrated in Figure 2.3-13. Maintenance costs are high, costing the County nearly $500,000 per year for the Dominguez Channel, Wilmington Drain, and Torrance Lateral.

Six cities and the County reported dry season flow (Table 2.3-20), but only the County monitors flow rates.

Figure 2.3-13. Erosion adjacent to the Dominguez Channel.

2.3.3 Groundwater Hydrology

Groundwater is an integral part of the continuous hydrologic cycle. Some of the water that falls as precipitation from the atmosphere seeps into the ground and is stored as groundwater. Within the earth, there are many types of geologic formations, some of which are more conducive to storing water than others. Geological formations that have a high capacity for storing water and allowing water to slowly flow through them are called aquifers, and are typically made of permeable materials such as gravel, sand and fractured rock. These formations are often separated from each other by formations that restrict groundwater flow, called aquicludes. Together, the aquifers and aquicludes define the hydrogeology of a groundwater basin. Water leaves the aquifers by natural processes such as springs or discharges to lakes and streams or is extracted (pumped) by wells. The amount of water entering and leaving a groundwater basin by either natural or artificial processes determines the groundwater balance of a basin (Groundwater Foundation 2000).

Groundwater is an important resource. It is used by more than 50 percent of the United States population as their source of drinking water (nearly 100 percent of people living in rural areas use groundwater as their source of drinking water). In addition, groundwater is used for irrigation in agricultural areas and for the public water supply (Groundwater Foundation 2000). In the groundwater basin underlying the Dominguez Watershed, groundwater currently provides about 34 percent of the total water used (WRDSC 2002b). For these reasons, maintaining an acceptable quality of the groundwater is crucial.

Unfortunately, in many coastal areas, the over pumping of groundwater may cause seawater to intrude on the groundwater basins and contaminate wells. To prevent this problem, projects have been undertaken to pump fresh water into aquifers to reverse the process of seawater intrusion. Also, groundwater may become contaminated from pollutants originating from landfills, septic and gas tanks, fertilizers and pesticides. In order to maintain the safe use of groundwater for human activities, groundwater is sampled and analyzed to determine compliance with drinking water standards for a variety of constituents.

2.3.3.1 Groundwater Basin Characteristics

The Dominguez Watershed is located within the Los Angeles sedimentary basin. The basin is subdivided by geologic features such as faults into smaller groundwater basins. The groundwater basin underlying the Dominguez Watershed is the West Coast Basin (WCB) (Figure 2.2-6, see Section 2.2) The WCB is comprised of four major aquifers. These aquifers are the Gage (61 meters [200-foot] Sand), Lynwood (122 meters [400-foot] Gravel), Silverado, and Sunnyside. Aquicludes separate and confine vertical movement of groundwater through these aquifers (WBMWD 1991). However, studies conducted in 1990 by the USEPA indicate there may be gaps in the El Segundo Aquiclude permitting water to percolate from the Gage Aquifer to the underlying Lynwood Aquifer (City of Torrance 1992).

The WCB is approximately 144 square miles, bounded on the south by the Palos Verdes Hills, to the west by the Pacific Ocean, to the north by the Santa Monica Basin (Ballona Escarpment) and to the east by the Central Basin. The West Coast and Central basins are separated by the Newport-Inglewood Fault. In the northern portion of the WCB, the north-south trending Charnock fault restricts east-west groundwater flow within the basin.

Underlying the Dominguez Watershed are four major aquifers. The locations and depths of these aquifers vary depending on localized geologic features. The shallowest aquifer is the Gage Aquifer (61 meters [200-foot] Sand). It is approximately 30 to 61 meters (100 to 200 feet) below the surface. It varies in thickness from 15 to 23 meters (50 to 75 feet) of medium to coarse sand and minor gravel in lenses and thin beds separated by relatively impermeable silts and fine sands (Zielbauer et al. 1962). Below the Gage Aquifer is the El Segundo Aquiclude. It is composed of silty sand and clay. Next, the Lynwood (122 meters [400-foot] gravel) Aquifer is a semi-confined unit within the San Pedro geologic formation comprised of coarse gravel, sand, silt and clay (City of Lomita 1998). It is separated from the Silverado Aquifer below by an impermeable layer of coarse sand, sandy silt and clay. The Lynwood Aquifer merges with the Gage and Silverado Aquifers near the Santa Monica Bay and at the Newport-Inglewood Fault Zone. The Silverado Aquifer is comprised of continental and marine sediments. It varies from 30 to 61 meters (100 to 200 feet) in the northern portion of the basin to 91 to 152 meters (300 to 500 feet) in the south and reaches depths of 366 meters (1,200) feet below the surface. It consists of thick, very highly permeable sand, very coarse sand, and gravel in the northern part of the area thinning and grading to silt and very fine sand or clayey silt southward (Zielbauer et al. 1962). Below the Silverado Aquifer in the western portion of the WCB is the Redondo Beach Aquiclude. It is a silty sand and clayey silt geologic unit. In the eastern portion of the WCB, the Sunnyside Aquifer underlies the Silverado Aquifer (WBMWD 1991). Beneath the Sunnyside Aquifer is the Pico Formation that signifies the geologic time break between the more recent Pleistocene Age to the Pliocene demonstrated by the change in coastal marine sediments of the area. Within this formation is the moderately permeable Pico aquifer which consists of alternate thick, fine to medium sands with intermixed silt, and very fine sand separated by thinner zones of clayey silt or silty clay area (Zielbauer et al. 1962).

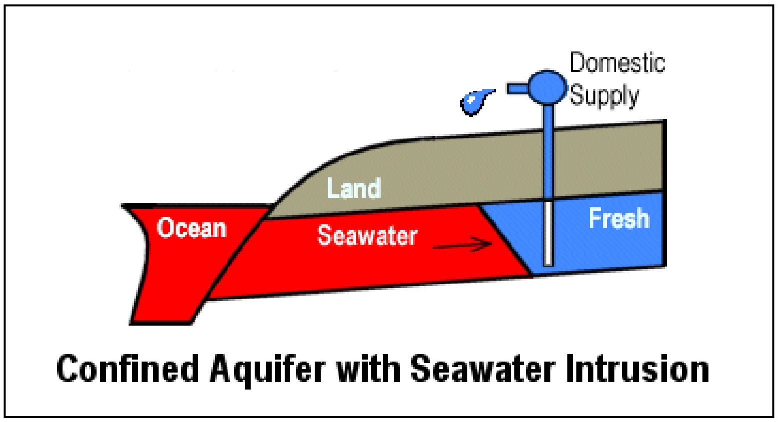
2.3.3.2 Groundwater Balance

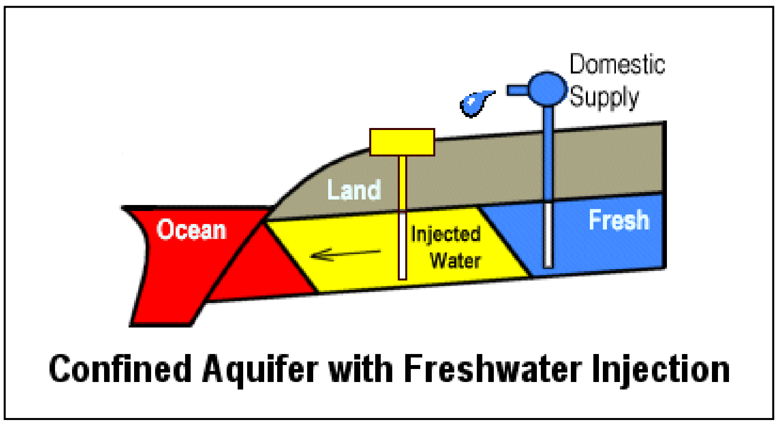
Inflow of water to the groundwater system within the WCB occurs both naturally and artificially. Natural inflow includes replenishment of groundwater by infiltration of regional precipitation and applied water (applied water includes water used in agriculture or landscaping purposes) and groundwater underflow from adjacent basins (i.e. across the Newport-Inglewood Fault from the Central Basin). Artificial inflow is the replacement of water at spreading grounds or seawater barrier wells. This water is purchased for the purpose of replenishing groundwater stores, and otherwise would not enter the groundwater system naturally (i.e., West Coast Barrier and Dominguez Gap Barrier Projects) (WRDSC 2002a).

Outflow of water from the WCB also occurs naturally and artificially. Natural outflow from the basin occurs as underflow to adjacent basins. Artificial outflow is the production of groundwater from the basin's aquifers and is the primary source of outflow from the basin (WRDSC 2002a). Figure 2.2-6 (see Section 2.2) illustrates the locations of groundwater production wells within the WCB. Table 2.3-21 depicts the groundwater budget (inflow vs. outflow) for the WCB for 1989.

2.3.3.3 Seawater Intrusion

Along the coastline, there is a natural interface of freshwater and seawater underground. If the aquifer near the coast is not being replenished with fresh water equal or faster to the rate of outflow (i.e. groundwater production), the interface between freshwater and seawater will migrate inland (Figure 2.3-14). This intrusion of seawater inland may result in wells pumping salt water instead of freshwater, thereby resulting in unusable drinking water. Injecting freshwater into an aquifer along the coastline may help to reduce or reverse the seawater intrusion process (Figure 2.3-14).





Injection Well

Figure 2.3-14. Diagrams of seawater intrusion and groundwater injection process.

Table 2.3-21. West Coast Basin water budget.

West Coast Basin	Acre-Feet/Year
Inflow:	
West Coast Basin Injection Barrier	25, 300
Dominguez Gap Injection Barrier	7,600
Inland Flow From the Santa Monica Bay	4,500
Recharge from Deep Percolation	4,500
Recharge across Newport-Inglewood Structural Zone	17,000
Total Inflow	58,900
Outflow:	
Seaward loss from West Coast Basin Barrier	5,600
Groundwater Extraction	53,000
Total Outflow	58,600

Source: CH2M Hill 1990

Seawater intrusion into the WCB began in the 1940's following the over pumping of groundwater. This resulted in the presence of saltwater in groundwater supplies. Successful tests of injecting fresh water into wells during the 1950's led to the implementation of the West Coast Barrier Project and the Dominguez Gap Barrier Project (WBMWD 1991).

The West Coast Barrier Project includes 144 injection wells (as of 1991) located along the western-most boundary of the Dominguez Watershed from El Segundo to Redondo Beach (Figure 2.3-14; Figure 2.2-6, see Section 2.2). The West Coast Barrier Project was successful in preventing additional seawater intrusion, however, seawater was trapped inland of the barriers which continues to infiltrate groundwater sources (WRDSC 2002a). The Dominguez Gap Barrier Project, completed in 1971, is in the southern portion of the WCB, north of the Los Angeles Harbor (WRDSC 2002b). The effectiveness of this barrier is suspect and methods for improving its usefulness are being considered (WRDSC 2002a).

2.3.3.4 Groundwater Chemistry

The SWRCB designates the groundwater in the WCB as having several beneficial uses. Primarily, the groundwater basin is designated as being used for municipal and domestic supplies (this includes drinking water for community, military and individual water supply systems). The groundwater in the WCB is also designated for use in industrial processes and services as well as agriculture (LARWQCB 1994).

The Basin Plan further states that the groundwater shall not contain concentrations of chemical constituents in amounts that adversely affect any designated beneficial use. Therefore, the groundwater quality needs to meet drinking water standards. The CDHS sets a maximum contaminant level (MCL) for a variety of constituents in drinking water. The MCL is the legal maximum concentration a contaminant may occur in the drinking water.

Contamination of the Gage Aquifer has resulted from historical unregulated industrial and other development activities (City of Torrance 1992). Throughout the watershed, groundwater monitoring and redevelopment projects have identified site-specific areas of groundwater contamination. For example, groundwater has been affected by releases of petroleum hydrocarbons and chlorinated solvents in central Torrance (EDAW 2002); and at the site of a former creosote facility, at Berths 142-143 in Los

Angeles Harbor's West Basin groundwater has been contaminated by semi-volatile and volatile organic compounds, PAHs and metals (LAHD 1997).

The Water Replenishment District of Southern California (WRD) has performed sampling and conducted analyses of the groundwater quality within the West Coast Basin. The Regional Groundwater Monitoring Reports for the Central and WCB for Water Year (WY) 1999-2000 and WY 2000-2001 present consistent findings over that period. These reports detail groundwater quality results for key constituents including total dissolved solids (TDS), iron, manganese, nitrate, trichloroethylene (TCE), tetrachloroethylene (PCE), arsenic, hexavalent chromium, methyltertiary butyl ether (MTBE), perchlorate, and radon and are summarized below (WRDSC 2001 and 2002b):

- TDS concentrations were elevated in the WCB and in the Torrance and Dominguez Gap areas. Concentrations ranged from 210 to 15,000 milligrams per liter (mg/L) in WY 2000-2001. Potential sources of these high TDS values have not been determined; however, they may be caused by seawater intrusion or connate and oil field brines. Elevated TDS concentrations do not occur elsewhere in the region.

- Iron concentrations within the WCB exceed the MCL for this constituent. Concentrations of iron were reported as non-detect (ND) to 0.52 mg/L in WY 2000-2001. The MCL for iron is 0.3 mg/L. Potential sources for dissolved iron may be from reducing groundwater conditions, natural causes (igneous and sedimentary rocks) and subsurface anthropogenic materials.

- Manganese concentrations within the WCB exceed the MCL for this constituent. Concentrations of manganese were reported as ND to 1,200 micrograms per liter (μg/L) in WY 2000-2001. The MCL for manganese is 50 μg/L. Potential sources of high manganese concentrations have not been determined.

- Nitrate is an end product of the natural decomposition of human or animal wastes. Nitrate (as nitrogen) levels exceeded the MCL (10 mg/L) in the WCB. The higher levels of nitrate tended to be in the uppermost zone of nested well. Nitrate concentrations did not exceed the MCL in the lower Silverado Aquifer.

- TCE is a solvent used in metal cleaning and dry cleaning. The likely source of TCE into the groundwater is from improper disposal practices. TCE in the WCB exceeded the MCL in the WY 1999-2000 and 2000-2001 in both nested wells and production wells.

- PCE is a solvent used in metal degreasing, dry cleaning and textile processes. Similar to TCE, the likely source of PCE into the groundwater is from improper disposal practices. In WY 1999-2000 and 2000-2001, concentrations of PCE in the WCB were below the MCL in all but one nested well and were not detected in any production wells.

- Arsenic is a natural occurring element used as a wood preservative, semiconductor manufacturing, petroleum refining, and additives. In the WCB, arsenic was not detected above the more stringent MCL of 10 μg/L (effective 2006) in the Silverado Aquifer. There was one occurrence of arsenic exceeding the MCL below the Silverado Aquifer. The adjacent Central Basin, however, did have arsenic concentrations above the MCL in several locations.

- Chromium is a metal used in manufacturing stainless steel and metal plating operations. Trivalent and hexavalent chromium (total chromium) have been detected in nested wells in the WCB below the

MCL (50 μg/L). The occurrence of total chromium in the Central Basin was more frequent; however, results indicate the values were below the MCL as well.

- MTBE is a synthetic chemical added to gasoline to improve emissions from vehicles. MTBE was not detected in any of the nested or production wells in the WCB nor the adjacent Central Basin. Possible sources of MTBE are from leaking underground gasoline storage tanks and pipelines, spills and marine engine emissions.

- Groundwater was sampled and analyzed for perchlorate, a chemical used in production of solid rocket fuel, fireworks and explosive devices, during WY 1999-2000. None of the samples collected from nested wells exceeded the State Action Level (SAL) for this constituent and it was not detected in samples collected from production wells. The source of perchlorate in the groundwater is unknown.

- Radon is a naturally occurring radioactive gas found in drinking water and indoor air. Although there is no current standard for radon in drinking water, a standard has been proposed, and the WRD sampled for this constituent in WY 1999-2000. In the WCB, radon was detected in four nested wells and 17 production wells. One nested well and two production wells had radon concentrations that exceeded the proposed standard.

2.3.4 Water Quality

2.3.4.1 Sources of Contamination

Water quality is subject to degradation from a variety of sources. These sources may include, but are not limited to, the following (LARWQCB 1994):

- Municipal and industrial wastewater discharges.
- Cooling water discharges.
- Nonpoint source runoff (urban and agricultural runoff) including leaking septic systems, construction, and recreational activities.
- Oil spills.
- Vessel wastes.
- Dredging (resuspension of contaminated sediments).
- Illegal dumping.
- Natural oil seeps.
- Historical contamination.
- Trash and debris.
- Aerial deposition.

Nonpoint source runoff can be a significant contributor of contaminants. These pollutants may impair water quality and damage aquatic ecosystems, which may ultimately decrease the beneficial uses of the area. Contaminants can enter natural waters through a variety of transport mechanisms including storm water runoff and dry weather discharges.

Storm water runoff occurs when precipitation falls on urbanized areas. The more impervious the surface, the more runoff generated. As water flows across surface areas it can carry previously accumulated contaminants and transport them into water systems. The Dominguez Watershed has the highest impervious area of all watersheds in the Los Angeles region, with sixty-two percent impervious cover over its land coverage (LACDPW 2000a).

Dry weather discharges occur when water enters the storm drain system from non-storm flows through a variety of urban, commercial and industrial discharges. Considerable variation exists in the size and configuration of storm drain outlets to Dominguez Channel (Figure 2.3-15). In some cases, the outlets have large debris racks. Small trash and debris may be observed in the Channel, particularly after rain storms.

Dry weather discharges to the storm water conveyance system can originate from a variety of sources:

Sanitary wastewater sources

- Leaking sanitary wastewater (usually untreated) from improper sewer connections, exfiltration, or pipeline leakage or breaks.
- Leaking effluent from improperly operating or improperly designed septic tanks.

Automobile maintenance and operation sources

- Car wash wastewater.
- Radiator flushing wastewater.
- Engine degreasing wastes.
- Improper oil disposal.
- Leaking underground storage tanks.

Irrigation sources

- Lawn runoff from over-watering.
- Direct spraying of impervious surfaces.

Relatively clean water sources

- Infiltrating groundwater.
- Water routed from pre-existing springs or streams.
- Infiltrating potable water from leaking water mains.

Other Sources

- Household chemicals.
- Laundry wastewater.
- Non-contact cooling waters.
- Metal plating baths.
- Dewatering of construction sites.
- Washing of concrete trucks.
- Sump pump discharges.
- Improper disposal of household toxic substances.
- Spills from roadway and other accidents.
- Chemical, hazardous materials, garbage, sanitary sludge landfills and disposal sites.
- Leaking tanks and pipes.

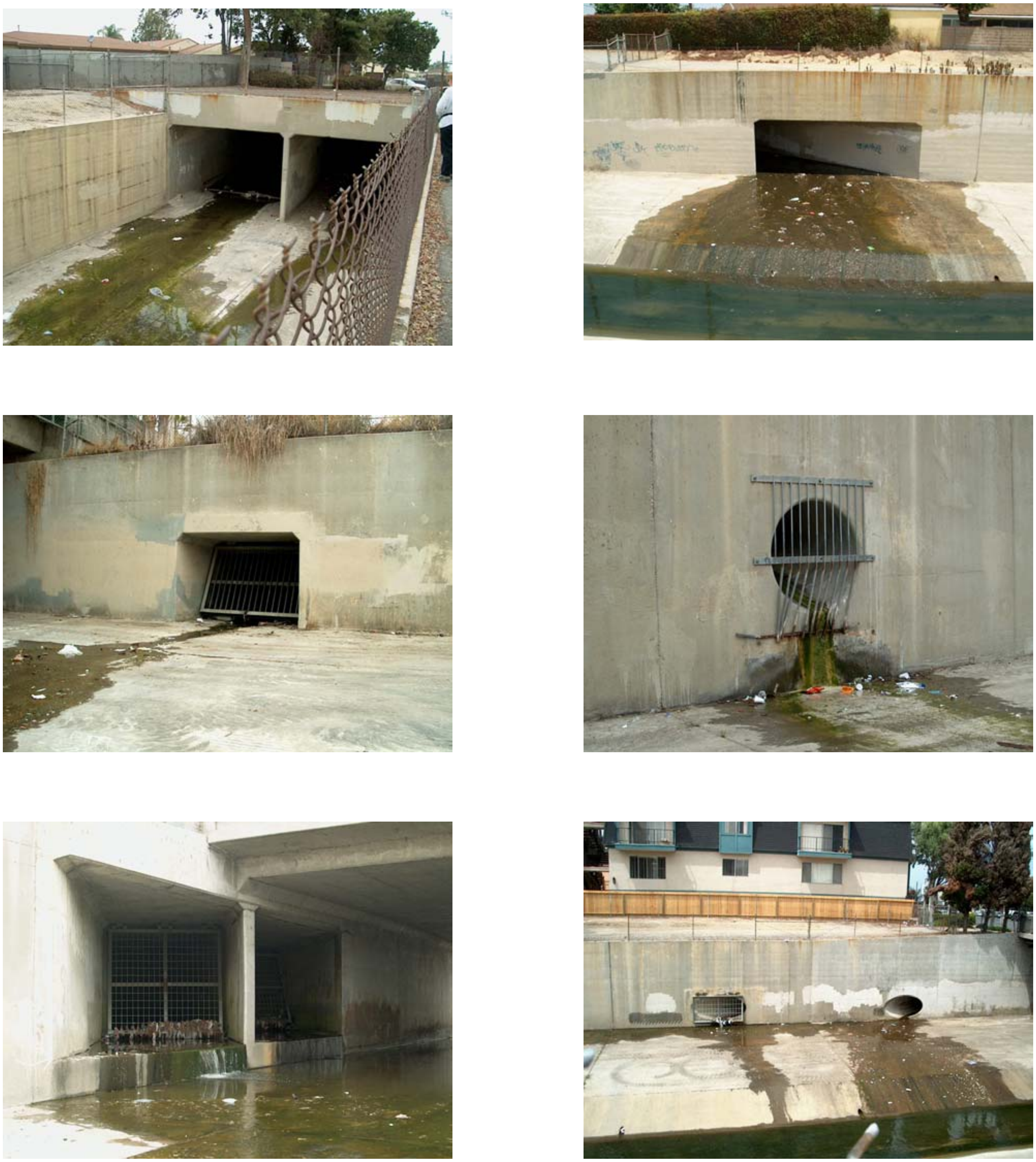


Figure 2.3-15. Typical views of dry weather discharge to the Dominguez Channel, June 2002.

Table 2.3-22 lists common inappropriate entries into the storm drainage system according to general land use categories.

Table 2.3-22. Potential inappropriate entries into storm drainage systems.

Potential Source	Storm Drain Entry		Flow Characteristics		Contamination Category		
	Direct	Indirect	Continuous	Intermittent	Pathogenic/Toxic	Nuisance	Clear
Residential Areas							
Leaking sanitary wastewater	●	❍	●	❍	●	❍	
Leaking septic tank effluent		●	●	❍	●	❍	
Household chemicals	❍	●		●	●		
Laundry wastewater	●			●		●	
Excess landscaping watering		●		●	❍	❍	●
Leaking potable water		●	●				●
Commercial Areas							
Gasoline filling station	●	❍		●	●		
Vehicle maintenance/repair	●	❍		●	●		
Laundry wastewater	●		●	❍	❍	●	
Construction site dewatering		●	●	❍		●	
Leaking sanitary wastewater	●	❍	●		●		
Industrial Areas							
Leaking tanks and pipes	❍	●	●	❍	●		
Miscellaneous process waters	●	❍	●	❍	●	❍	❍

Notes: ●: most likely condition
❍: may occur
Blank: not very likely

Source: USEPA 1993

Urban runoff can contain a variety of pollutants. The following presents a brief list of common constituents found in urban runoff:

Conventional Constituents

The background levels in natural waters and/or water quality objectives are listed below, where appropriate.

- **pH:** The measurement of pH provides a reading of acidity or alkalinity and may indicate the presence of other constituents of concern. The pH of natural waters ranges from 6.0 to 9.0 (USEPA 1993). Measurements outside of this range could be an indicator of commercial or industrial discharges. The Basin Plan objective specifies that pH of inland surface waters shall not be depressed below 6.5 or raised above 8.5, and ambient levels shall not be changed more than 0.5 units from natural conditions. In addition, the pH of bays or estuaries shall not be depressed below 6.5 or raised above 8.5, and ambient levels shall not be changed more than 0.2 units from natural conditions.

- **Conductivity:** The level of conductivity is a measure of how well water conducts an electrical current. Conductivity (also referred to as specific conductance) can be an indirect measure of the presence of dissolved solids such as chloride, nitrate, sulfate, phosphate, sodium, iron, magnesium, and calcium. The conductivity of saltwater is generally above 43 mS/cm.

- **BOD:** Biochemical Oxygen Demand (BOD) is measured over 5 days and represents the oxygen consumed through the biodegradation of organic matter in the sample. The water quality objective in the USEPA Multi-Sector General Permit for Industrial Activities is 30 mg/L for BOD. The Basin Plan objective specifies that waters shall be free of substances that result in increases of BOD which adversely affect beneficial uses.

- **COD:** Chemical Oxygen Demand (COD) is measured over 24 hours and represents the oxygen consumed in the oxidation of organic matter by a strong chemical oxidizer during that time period. Both BOD and COD are useful in assessing the organic matter load or content of the sample. The water quality objective in the USEPA Multi-Sector Permit for Industrial Activities is 120 mg/L for COD.

- **Chlorine:** Disinfection of wastewaters with chlorine produces a chlorine residual. Chlorine and its reaction products are toxic to aquatic life. The Basin Plan objective for chlorine is 0.1 mg/L.

- **Color:** Color in water can result from natural conditions (e.g., from plant material or minerals) or can be introduced from commercial or industrial sources. Color is primarily an aesthetic consideration, although extremely dark colored water can limit light penetration and adversely affect photosynthesis of aquatic plants. The Basin Plan objective specifies that waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.

- **Exotic Vegetation:** Exotic (non-native) vegetation introduced in and around stream courses is often of little value as habitat (food and cover) for aquatic-dependent biota, and can out-compete native vegetation. The Basin Plan objective specifies that exotic vegetation shall not be introduced around stream courses to the extent that such growth causes nuisance or adversely affects beneficial uses.

- **Floating Material:** Floating materials can be an aesthetic nuisance as well as provide substrate for undesirable bacterial and algal growth and insect vectors. The Basin Plan objective specifies that waters shall not contain floating materials, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.

- **Dissolved Oxygen:** Adequate dissolved oxygen levels are required to support aquatic life. Depression of dissolved oxygen can lead to anaerobic conditions resulting in odors, or in extreme cases, fish kills. The Basin Plan objective specifies that all surface waters designated as WARM shall not be depressed below 5 mg/L; and for the area know as the Outer Harbor area of Los Angeles-Long Beach Harbors, the mean annual concentration shall be 6 mg/L or greater, provided that no single determination shall be less than 5 mg/L.

- **TDS:** Total dissolved solids (TDS) measures solid materials that pass through a 0.45 micron filter in a given water sample. No waterbody specific objectives are specified in the Basin Plan for the Dominguez Watershed.

- **TSS:** Total suspended solids (TSS) measures the solid material trapped on a 0.45 micron filter. TSS can include decaying plant matter, silts, clays, etc. The USEPA Multi-Sector General Permit for Industrial Activities water quality objective for TSS is 100 mg/L.

- **Turbidity:** Turbidity is a measure of the amount of light that can pass through water and is caused by suspended particulate matter such as clay, silt and organic matter and by plankton and other organisms. A higher presence of these particles in a water sample represents lower transparency and thus, higher turbidity units. The Basin Plan objective for turbidity is 20 Nephelometric Turbidity Units (NTU).

- **Oil and Grease:** Oil and grease is a measure of petroleum oils, animal fats and natural oils. The USEPA Multi-Sector General Permit for Industrial Discharges water quality objective is 15 mg/L. The Basin Plan objective specifies that waters shall not contain oils, greases, waxes or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.

- **MBAS:** Surfactants are also known as Methylene Blue Active Substances (MBAS). Detergents are found in household and commercial cleaning and laundering products. Elevated detergent levels are a good indicator of commercial and/or residential wash water entering the storm water conveyance. Detergent (surfactant) concentrations are usually below 0.1 mg/L in natural waters and range from 1.0 to 20.0 mg/L in raw sanitary wastewaters (USEPA 1993). The Basin Plan objective is 0.5 mg/L.

Nutrients

- **Nitrogen:** Nitrogen is a basic building block of life and the various forms of nitrogen are part of the nitrogen cycle. Nitrogen is essential to plant growth and excessive nitrogen compounds can cause algal blooms or be indicative of pollution sources from agricultural/household fertilizer runoff, sewage, and other sources. Inorganic forms of nitrogen include nitrate, nitrite, ammonia, and nitrogen gas. Nitrate is highly soluble, dissolving easily in water and is stable over a wide range of conditions in the environment. Nitrite is less stable in water and is converted to nitrate. The Basin Plan objective is 45 mg/L for nitrate, 10 mg/L for nitrate-nitrogen, 10 mg/L for nitrate-nitrogen plus nitrite-nitrogen, and 1 mg/L for nitrite.

- **Ammonia:** Ammonia is another inorganic form of nitrogen and is not stable in water. Ammonia is easily transformed to nitrate in water with good oxygen levels. In low oxygen conditions, ammonia is transformed to nitrogen gas. Ammonia is a common ingredient in commercial and household cleaning products. In addition, organic material contains nitrogen, which can convert into ammonia by means of biochemical degradation. Elevated levels of ammonia may be an indication of decaying organic matter or discharges containing cleaning agents. Ammonia levels range from 6 to 380 mg/L in raw sanitary wastewater, and naturally range from 0.1 to 3.0 mg/L in all other waters (USEPA 1993). Basin Plan objectives for ammonia vary with temperature and pH. Four-day average concentrations of total ammonia to protect aquatic life in WARM designated waters range from 0.19 to 2.6 mg/L for temperatures ranging from 10 to 20°C (50 to 68°F) at pH values ranging from 6.5 to 9.

- **TKN:** Total Kjeldahl Nitrogen (TKN) is a measure of organic nitrogen. No water quality objective is identified for TKN.

- **Phosphorus:** Phosphorus, together with inorganic nitrogen, is an important nutrient for plant and phytoplankton growth. The USEPA Multi-Sector General Permit for Industrial Activities standards gives the water quality objective for both total and dissolved phosphorus as 2 mg/L.

Trace Metals and Hardness

Total and dissolved metals can include antimony, arsenic, cadmium, chromium, copper, lead, nickel, selenium, and zinc. Background levels are provided below based on data from Standard Methods for the Examination of Wastewater (1998). No water quality objectives are specified in the Basin Plan for trace metals except for drinking water. The 40 CFR Part 131 - California Toxic Rule water quality objectives for dissolved metals are based on total hardness in the water (refer to Table 2.3-1). Ocean Plan limiting concentrations for the protection of aquatic life (refer to Table 2.3-5) are listed below, as appropriate.

- **Cadmium:** Cadmium occurs in sulfide minerals that also contain zinc, lead, or copper. It is used in electroplating, batteries, paint pigments, and alloys with various other metals. It is usually associated with zinc at a ratio of about one part cadmium to 500 parts zinc in most rocks and soils. It is nonessential for plants and animals and is toxic and accumulates in the kidneys and liver. Cadmium levels naturally range from 0.1 to 0.5 ppm in soils, up to 1 μg/L in streams, and from 1 to 10 μg/L in groundwaters. The Ocean Plan objectives are 1, 4, and 10 μg/L for 6-month median, daily, and instantaneous limiting concentrations, respectively.

- **Chromium**: Chromium is found in chrome-iron ore and is used in alloys, in electroplating and in pigments. Chromate compounds are commonly added to cooling waters for corrosion control. Trivalent chromium is essential to carbohydrate metabolism in animals; whereas, hexavalent chromium is toxic to plants, aquatic animals, and is both an epithelial irritant and known carcinogen in humans. Chromium levels range from 11 to 22 ppm in soils, average 1 μg/L in streams, and 100 μg/L in groundwaters. The Ocean Plan objectives for chromium (hexavalent) are 2, 8, and 20 μg/L for 6-month median, daily, and instantaneous limiting concentrations, respectively.

- **Copper:** Copper occurs in its native state, but is also found in many minerals. It is widely used in electrical wiring, plumbing, roofing, various alloys, pigments, cooking utensils, brake pads, and the chemical industry. Copper is considered an essential trace element for plants and animals but may be toxic at high concentrations. Copper levels naturally range from 9 to 33 ppm in soils, 4 to 12 μg/L in streams, and less than 0.1 mg/L in groundwater. The Ocean Plan objectives are 3, 12, and 30 μg/L for 6-month median, daily, and instantaneous limiting concentrations, respectively.

- **Lead:** Lead is normally found in the mineral galena. It is commonly used in batteries, ammunition, solder, piping, pigments, insecticides, and some alloys. It is nonessential for plants and animals and is toxic by ingestion and is a cumulative poison. Lead levels naturally range from 2.6 to 25 ppm in soils, up to 3 μg/L in streams, and less than 0.1 mg/L in groundwaters. The Ocean Plan objectives are 2, 8, and 20 μg/L for 6-month median, daily, and instantaneous limiting concentrations, respectively.

- **Mercury:** Mercury occurs free in nature and is used in amalgams, mirror coatings, vapor lamps, paints, measuring devices (thermometers, barometers, manometers), pharmaceuticals, pesticides, and fungicides. It is commonly used in paper mills as a mold retardant for paper. It is nonessential for plants and animals and is toxic by ingestion and is a cumulative poison. Mercury levels naturally range from 30 to 160 ppb in soils, up to 0.07 μg/L in streams, and 0.5 μg/L in groundwaters. The Ocean Plan objectives are 0.4, 0.16, and 0.4 μg/L for 6-month median, daily, and instantaneous limiting concentrations, respectively.

- **Nickel**: Nickel comes from the minerals pyrrhotite and garnierite and is used in alloys, magnets, protective coatings, catalysts and batteries. It is nonessential for plants and animals, and toxicity at higher concentrations varies widely according to species. Nickel levels naturally range from 2.5 ppm in soils, up to 1 μg/L in streams, and less than 0.1 mg/L in groundwaters. The Ocean Plan objectives are 5, 20, and 50 μg/L for 6-month median, daily, and instantaneous limiting concentrations, respectively.

- **Selenium**: Selenium is a semimetallic element and is used in electronics, ceramics, and shampoos. It is toxic mainly through dietary exposure and bioaccumulates up the food chain. Selenium values naturally range from 0.27 to 0.74 ppm in soils, to 0.2 μg/L in streams, and less than 0.1 mg/L in groundwaters. The Ocean Plan objectives are 15, 60, and 150 μg/L for 6-month median, daily, and instantaneous limiting concentrations, respectively.

- **Zinc:** Zinc occurs in its native state and is used in many alloys such as brass and bronze. It is also used in batteries, fungicides and pigments. It is an essential growth element for plants and animals, but at elevated levels it is toxic to some species of aquatic life. Zinc levels naturally range from 25 to 68 ppm in soils, up to 20 μg/L in streams, and less than 0.1 mg/L in groundwaters. The Ocean Plan objectives are 20, 80, and 200 μg/L for 6-month median, daily, and instantaneous limiting concentrations, respectively.

Pesticides

- **Diazinon:** Diazinon is an organophosphate insecticide. It kills insects, as well as other organisms through its effect on the nervous system. It is moderately persistent and has moderate to high mobility in soil. Diazinon, in high enough concentrations, is highly toxic to birds, mammals, honeybees, and other beneficial insects. It is also very highly toxic to freshwater fish and invertebrates following acute exposure. The California Department of Fish and Game (CDFG) water quality objective for freshwater aquatic life for diazinon is 0.08 μg/L.

- **Chlorpyrifos:** Chlorpyrifos is also an organophosphate insecticide and is the most widely used insecticide in the United States. It is used in agriculture on a variety of crops and for residential use as a termiticide, mosquitocide, lawn treatment, as well as other uses. It adsorbs readily to soil particles and therefore is not highly mobile in soil. Chlorpyrifos presents a high risk to birds, fish and mammals and an even a higher risk to aquatic invertebrates. The CDFG water quality objective for freshwater aquatic life for chlorpyrifos is 0.02 μg/L.

- **DDT**: Dichlorodiphenyltrichloroethane (DDT) is a colorless chemical pesticide and was used to eradicate disease-carrying and crop-eating insects. DDT is a highly persistent chemical with a low potential for degradation that has an affinity for soils and sediments where it can accumulate. It also can bioaccumulate in tissues of plants and animals where they can attain concentrations that create adverse biological effects. The major forms of toxicity exhibited by DDTs include neurotoxicity, hepatotoxicity, reproductive effects, metabolic effects, and cancer (ASTDR 2000). No single regulatory standard exists for DDT. Instead guidance values range in concentration from the Food and Drug Administration (FDA) Action Level (5 parts per million (ppm) for application to edible fish and shellfish that was promulgated in the 1970's to much lower concentrations that have been more recently developed such as the USEPA Reference Dose (0.17 ppm) and State fish consumption advisory trigger level (0.1 ppm). In 1972, DDT was banned in the U.S. except for use in extreme health emergencies.

Organic Compounds

- **PCBs**: Polychlorinated biphenyls (PCBs) were used in transformer oils as a heat-exchange medium and although their use has been banned, there are still many transformers in use that still contain these compounds. PCBs are toxic, bioaccumulative, and extremely stable (persistent) in the environment (Standard Methods 1998). Industrial applications relied on various mixtures of PCBs with different chemical structures. PCB toxicity varies according to chemical structure. PCBs may result in neurotoxic, estrogenic and antiestrogenic, thyroid metabolism, and immune system effects, and potentially cancer. Similar to DDT, no single regulatory standard exists for PCBs. Instead guidance values range in concentration from the FDA Tolerance Level (2 ppm) to lower concentrations recently developed such as the USEPA Reference Dose (0.007 ppm) and State fish consumption advisory trigger level (0.1 ppm). The Basin Plan objective specifies that pass-through or uncontrollable discharges to waters of the Region, or at locations where the waste can subsequently reach water of the Region, are limited to 70 picograms per liter (pg/L) (30-day average) for protection of human health and 14 nanograms per liter (ng/L) and 30 ng/L (daily average) to protect aquatic life in inland fresh waters and estuarine waters, respectively.

- **PAHs**: Polynuclear aromatic hydrocarbons (PAHs) are products of petroleum processing or combustion. Sources of PAHs include tire wear, asphalt, vehicle exhausts, lubricating oils and grease, and industrial effluents. Many of these compounds are carcinogenic at relatively low levels.

Bacterial Indicators

Bacteria are commonly found in human and animal feces. They are generally not harmful themselves, but they do indicate the possible presence of pathogenic bacteria, viruses, and protozoans that also live in human and animal digestive systems. Total coliform, fecal coliform and *Enterococcus* bacteria are common test organisms for water quality sampling.

- **Total Coliforms:** Total coliforms are a group of bacteria that can occur in human feces, but can also be present in animal manure, soil and other places outside of the human body. The recent Basin Plan amendment and AB-411 specify that total coliform density shall not exceed 1,000/100 mL (geometric mean limit) or 10,000/100 mL (single sample limit) for marine waters designated for water contact recreation (REC-1). In addition, the Basin Plan amendment specifies that *E. coli* density shall not exceed 126/100 mL (geometric mean limit) or 235/100 mL (single sample limit) for fresh waters designated for water contact recreation (REC-1).

- **Fecal Coliforms:** Fecal coliforms are a subset of total coliforms and are more fecal-specific in origin. The recent Basin Plan amendment and AB-411 specify that fecal coliform density shall not exceed 200/100 mL (geometric mean limit) or 400/100 mL (single sample limit) for marine and fresh waters designated for water contact recreation (REC-1).

- **Enterococci:** Enterococci are a subgroup within the fecal *Streptococcus* group and are better suited for survivability in salt water. They are generally found in the digestive systems of humans and other warm-blooded mammals. The recent Basin Plan amendment and AB-411 specify that *Enterococcus* density shall not exceed 35/100 mL (geometric mean limit) or 104/100 mL (single sample limit) for marine waters designated for water contact recreation (REC-1).

Constituents of Concern

Constituents/impairments of concern for the Dominguez Watershed include:

- Algae.
- Ammonia.
- Bacteriological indicators and beach closures.
- Benthic community effects.
- ChemA pesticides: aldrin, chlordane, dieldrin, endosulfan, endrin, HCH (including lindane), heptachlor, heptachlor epoxide, and toxaphene.
- Cadmium, chromium, copper, lead, mercury, nickel, selenium, and zinc.
- DDT, PAHs and PCBs.
- Eutrophic (nutrient rich).
- Trash and odors.
- Sediment toxicity.

2.3.4.2 Water Quality Sampling in Dominguez Watershed

Water quality problems within the Dominguez Watershed were observed as early as 1926 when harbor tenants complained of ship hulls and building exteriors being darkened. The problem was due to hydrogen sulfide from septic waters being discharged to harbor waters. In 1947 an advisory committee report indicated that pollution in the northerly arm of the Consolidated Channel by organic wastes, oil, suspended matter, hydrogen sulfide and odorous gases originated from three main sources (LARWQCB 1969):

- Sewage, industrial, wastes, natural drainage, or a combination of these, from Dominguez Channel.
- Sludge beds deposited in the harbor area.
- Fish cannery wastes and domestic sewage from ships and small craft.

In 1952 a State Department of Public Health report noted the following observations:

- The greatest amount of oxygen depletion and highest biochemical oxygen demand occurred in the vicinities of Fish Harbor and at the mouth of Dominguez Channel.
- High bacterial counts were detected near cannery outfalls, but were within Public Health Department limits at most other locations.
- Floating sewage solids were not observed in the harbor.
- All samples contained small amounts of oil and grease. Oil and grease was observed on the water surface at Consolidated Channel, Cerritos Channel and in Fish Harbor.
- Heavy metals were not found in significant quantity in any samples.

A 1969 LARWQCB report made the following evaluations of the data for the 1960's:

<u>Los Angeles Inner Harbor</u>

- Dissolved oxygen objectives were not being met.

- Significant evidence or indications of physical changes of waters was observed including reduction in water clarity and presence of clouded water and suspended solids.

Long Beach Inner Harbor
- Water color and clarity, and dissolved oxygen concentrations were often affected by algal blooms.
- There had been no impairment of beneficial uses in the 1960's.

Long Beach Outer Harbor
- Waters were noted to be of good bacteriological quality.
- Inner Harbor water quality did not appear to have an effect on outer harbor waters.
- No significant change in outer harbor waters was observed in the 1960's.

The LARWQCB has data from sampling done in the Dominguez Watershed from 1967 to 1968 and again from 1986 to 1992. Locations sampled fresh waters in the Dominguez Channel above Vermont Avenue, and estuarine waters below Vermont Avenue, at Anaheim Street, and at Wilmington Avenue. Table 2.3-23 presents a summary of the results.

LACDPW conducted water quality sampling of primarily fresh waters within the Dominguez Watershed from 1987 through 1995. Storm water was regulated by an NPDES permit in 1990 (see below). Grab samples were collected along the Dominguez Channel at Vermont Avenue, along the Torrance Lateral at Main Street and along the Wilmington Drain at Pacific Coast Highway (PCH). Table 2.3-24 presents a summary of the historical data.

Storm Water Monitoring

LACDPW began conducting storm water monitoring under the Los Angeles NPDES Municipal Storm Water Permit during the 1994-1995 storm season. The 1994-95 storm season was the first season in which storm water monitoring was required under the 1990 Municipal Storm Water Permit Order No. 90-079. Annual storm water monitoring continued under the 1990 Permit until the 1996-1997 season, which was the first season in which storm water monitoring was conducted under the new 1996 Municipal Permit (Order No. 96-054). Monitoring continued under this permit until 2001 when the LARWQCB issued the most recent Permit Order No. 01-182.

From 1994 through 2000 Los Angeles County's storm water monitoring programs included mass emission station monitoring and land use station monitoring. Monitoring stations were located throughout the region with two land use stations located within the Dominguez Watershed (Figure 2.3-1). The objectives of the land use monitoring element were: (1) to evaluate possible effects of land use on water quality; (2) to evaluate the relative importance of land use as pollution sources; and (3) to provide data to estimate watershed project pollutant loads (LACDPW 2001a).

The Dominguez Channel Monitoring Station (S23) was a land use monitoring station located in the City of Lennox, near the intersection of 116th Street and Isis Avenue. The primary land use for this station was transportation. From 1994 through 2000 there were 72 composite samples and 4 grab samples collected at this station.

Table 2.3-23. Summary of water quality parameter concentrations in the Dominguez Watershed.

	Units	Minimum	Average	Maximum
Above Vermont Ave				
Total Alkalinity (as CACO3)	mg/L	14	169	282
Calcium	mg/L	10	343	1,370
Chloride	mg/L	7	538	11,900
Dissolved Oxygen	mg/L	0.0	5.9	19.7
Hardness (as CACO3)	mg/L	27	405	4,080
Magnesium	mg/L	3	168	2,850
Nitrate (as NO3)	mg/L	0.0	3.3	27.5
pH	pH units	6.6	8.1	10.4
Potassium	mg/L	3	96	1,560
Sodium	mg/L	23	1,112	45,600
Sulfate	mg/L	8	254	1,790
Total Dissolved Solids (TDS)	mg/L	109	1,228	17,411
Anaheim St				
Total Alkalinity (as CACO3)	mg/L	20	123	231
Calcium	mg/L	105	847	4,320
Chloride	mg/L	411	17,941	180,000
Dissolved Oxygen	mg/L	0.0	3.1	9.3
Hardness (as CACO3)	mg/L	151	5,395	6,430
Magnesium	mg/L	260	2,473	12,300
Nitrate (as NO3)	mg/L	0.0	1.0	20.0
pH	pH units	6.4	7.8	8.7
Potassium	mg/L	103	867	4,250
Sodium	mg/L	231	23,140	109,000
Sulfate	mg/L	71	2,371	2,850
Total Dissolved Solids (TDS)	mg/L	10,778	29,870	34,121
Below Vermont Ave				
Total Alkalinity (as CACO3)	mg/L	15	147	262
Calcium	mg/L	13	432	3,205
Chloride	mg/L	7	7,007	80,900
Dissolved Oxygen	mg/L	0.0	3.5	16.5
Hardness (as CACO3)	mg/L	28	2,132	4,430
Magnesium	mg/L	3	931	8,083
Nitrate (as NO3)	mg/L	0.0	2.3	33.6
pH	pH units	5.9	7.7	9.1
Potassium	mg/L	5	379	2,360
Sodium	mg/L	10	8,394	60,500
Sulfate	mg/L	26	1,089	9,810
Total Dissolved Solids (TDS)	mg/L	88	10,970	21,800
Wilmington Ave				
Total Alkalinity (as CACO3)	mg/L	35	131	274
Calcium	mg/L	29	724	3,890
Chloride	mg/L	615	12,883	16,800
Dissolved Oxygen	mg/L	0.0	3.3	11.2
Hardness (as CACO3)	mg/L	210	4,296	9,650
Magnesium	mg/L	33	1,971	10,900
Nitrate (as NO3)	mg/L	0.0	0.6	9.4
pH	pH units	6.6	8.0	9.0
Potassium	mg/L	98	700	3,340
Sodium	mg/L	380	17,338	101,000
Sulfate	mg/L	124	1,946	2,440
Total Dissolved Solids (TDS)	mg/L	1,224	23,237	30,172

Source: LARWQCB 1967 to 1968 and 1986 to 1992 unpublished data

Table 2.3-24. Summary of historic water quality data for the Dominguez Watershed.

Constituent	Detection Limit	Dominguez Channel at Vermont			Torrance Lateral at Main			Wilmington Drain at PCH		
	MDL (mg/l):	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum
Conventional										
pH	0-14	6	8.1	9.7	3.41	7.9	9.62	6.21	7.6	8.81
Conductivity	1μmhos/cm	66	2004.9	28600	82	1015.2	2620	74	1129.7	4105
Total Dissolved Solids	5.0	32	1313.7	20758	46	647.5	1710	44	765.7	2600
Total Suspended Solids	1.0	16	296.7	1452	9	216.2	2508	13	225.2	1143
Volatile Suspended Solids	1.0 mg/L/hr	8	58.7	304	6	67.7	796	3	60.0	590
Total Organic Carbon	1.0	0	16.7	82.79	0	18.1	61.15	0	19.3	123.2
Biochemical Oxygen Demand	1.0	0	16.2	153	1.7	18.7	145	0	22.9	106
Total Petroleum	mg/L	0.0	0.6	13.0	0.0	0.0	121.0	0.00	0.32	11.00
Oil and Grease	mg/L	0.0	1.6	9.9	0.0	2.3	28.0	0.00	1.77	18.30
General Mineral										
Calcium	2.0	5.4	63.6	281	6.4	65.3	126.9	4.8	82.5	232
Magnesium	2.0	0	48.9	815	0	31.8	385	0	41.8	180
Potassium	1.0	0.14	19.7	454	1.7	9.8	120	1.68	11.9	76
Sodium	5.0	4.2	315.7	6500	4.9	108.6	344	1.974	94.7	249
Chloride	2.0	3.3	551.3	13674	3.9	185.7	669	5.04	141.4	398
Fluoride	0.1	0	0.4	5.01	0	0.6	10.9	0	6.2	310
Sulfate	0.1	7.1	170.0	1922	9.5	84.6	402	8.63	257.7	1050
Alkalinity	4.0	15.3	149.3	273	15.3	185.0	382	12.6	143.6	332
Hardness	5.0	18	359.5	4050	20	281.2	520	20	370.8	1320
Nutrients										
Ammonia	0.1	0	0.3	8.22	0	0.7	22.4	0	1.0	15
Total Phosphorus	0.05	0.11	0.3	0.5	0	0.2	0.5	0.08	0.3	1.3
Nitrate as Nitrogen	0.03	0	1.0	6.16	0	0.5	4.516	0	0.9	7.79
Nitrite as Nitrogen	0.03	0	0.1	0.96	0	0.0	0.66	0	0.2	3.04
Metals										
Dissolved Arsenic	0.01	0	2.2	160	0	3.0	35	0	1.1	21
Total Arsenic	0.01	0	4.1	19	0	2.8	23	0	1.4	12
Dissolved Barium	0.1	0	64.0	274	0	77.4	300	0	63.3	450
Total Barium	0.1	0	50.8	212	0	44.7	290	0	76.8	339
Dissolved Boron	0.25	0	368.0	2000	0	349.0	1320	0	942.5	3750
Total Boron	0.25	0	48.5	485	0	69.8	460	0	76.7	820
Dissolved Cadmium	0.01	0	0.2	20	0	0.1	10	0	0.3	13
Total Cadmium	0.01	0	0.4	10	0	0.0	0	0	0.4	10
Dissolved Chromium 136	0.01	0	0.0	0	0	0.0	0	0	0.0	0
Total Chromium 136	0.01	0	2.1	106	0	3.5	210	0	2.8	70
Dissolved Copper	0.01	0	13.6	80	0	9.1	60	0	9.9	140
Total Copper	0.01	0	44.9	120	0	40.6	190	0	28.3	100
Dissolved Iron	0.1	0	226.1	2400	0	692.4	27600	0	735.7	23000
Total Iron	0.1	0	2393.2	12500	0	1707.2	18000	0	1559.2	12600
Dissolved Lead	0.01	0	10.6	290	0	7.4	90	0	12.1	290
Total Lead	0.01	0	43.7	200	0	52.4	440	0	33.5	260
Dissolved Manganese	0.03	0	22.0	147	0	46.3	570	0	85.5	620
Total Manganese	0.03	0	57.3	290	0	97.6	890	0	44.2	260
Dissolved Mercury	0.001	0	0.0	2	0	0.0	1.2	0	0.0	1.3
Total Mercury	0.001	0	0.1	2	0	0.1	3	0	0.1	3
Dissolved Nickel	0.01	0	4.2	101	0	3.3	40	0	13.0	197
Total Nickel	0.01	0	15.0	80	0	15.2	80	0	15.4	60
Dissolved Selenium	0.005	0	0.7	29	0	0.8	62	0	1.3	67
Total Selenium	0.005	0	0.3	6	0	0.3	6	0	0.0	0
Dissolved Silver	0.01	0	0.2	20	0	0.0	0	0	0.0	0

Constituent	Detection Limit	Dominguez Channel at Vermont			Torrance Lateral at Main			Wilmington Drain at PCH		
	MDL (mg/l):	Minimum	Average	Maximum	Minimum	Average	Maximum	Minimum	Average	Maximum
Total Silver	0.01	0	2.1	50	0	0.0	0	0	0.0	0
Dissolved Zinc	0.05	0	70.2	2370	0	55.0	370	0	61.7	980
Total Zinc	0.05	0	274.5	850	0	303.3	1800	0	174.9	790
Bacterial Indicators										
Total Coliform	MPN	13	57,771	330,000	230	334,873	9,300,000	930	38,197	790,000
Fecal Coliform	MPN	0	9,469	160,000	130	54,674	930,000	33	8,336	160,000
Enterococcus	MPN	20	5,236	90,000	0	4,593	49,000	20	5,023	50,000

Source: LACDPW 1987 to 1995 unpublished data

The Project 1202 Monitoring Station (S24) was located in the City of Carson, near the intersection of Wilmington Avenue and 220th Street. Land use for this station was predominately industrial. From 1994 through 2000 there were 54 composite samples and 5 grab samples collected at this station.

LACDPW summarized its findings of their storm water monitoring programs from 1994 to 2000. The following are some of the results that apply to the Dominguez Watershed (LACDPW 2000a):

- Light industrial and transportation land uses displayed the highest median values for total and dissolved copper. Transportation had the highest levels of total and dissolved copper with levels of 28 μg/L and 40 μg/L respectively.
- Light industrial land use displayed the highest median values for total and dissolved zinc with levels of approximately 300 μg/L for dissolved zinc and 360 μg/L for total zinc.
- Light industrial land use displayed the highest median concentrations of TSS at approximately 130 μg/L.
- There was no difference observed between any of the industry types for total and dissolved zinc levels and TSS.

Table 2.3-25 provides an indication of the frequency various constituents were consecutively detected in monitoring samples. The land use types presented are relevant to the monitoring stations that were located within the Dominguez Watershed.

LACDPW redesigned its monitoring program for the 2001-2002 storm water season to meet the new RWQCB requirements. The new program no longer included land use stations, but did add a mass emission station along the Dominguez Channel. The land uses (LACDPW 2002) for this station are:

- High density single-family residential (35.6 percent).
- Light industrial (13.1 percent).
- Retail commercial (7.6 percent).
- Multi-family residential (7.9 percent).
- Transportation (7.6 percent).
- Educational (4.6 percent).
- Mixed residential (8.4 percent).
- Other (15.4 percent).

Table 2.3-25. Land use constituent detection rates 1994-2000.

	Transportation	Light Industrial
Conventional		
Chemical Oxygen Demand	-	-
pH	-	-
Specific Conductance	-	-
Total Dissolved Solids*	-	-
Turbidity*	-	-
Total Suspended Solids*	-	-
Volatile Suspended Solids*	-	-
Methylene Blue Active Substances	X	-
Total Organic Carbon	-	-
Biochemical Oxygen Demand	-	-
Cyanide*	O	O
Total Petroleum Hydrocarbons	O	O
Oil and Grease	O	O
Total Phenols	O	O
Indicator Bacteria*	O	O
General Mineral		
Calcium	-	-
Magnesium	-	-
Potassium	-	-
Sodium	-	-
Bicarbonate	-	-
Carbonate	X	X
Chloride	-	-
Fluoride	X	X
Nitrate	-	-
Sulfate	-	-
Alkalinity	-	-
Hardness	-	-
Nutrients*		
Ammonia	-	-
Dissolved Phosphorus*	-	-
Total Phosphorus*	-	-
NH3-Nitrogen*	-	-
Nitrate-Nitrogen*	X	-
Nitrite-Nitrogen*	-	-
Total Kjeldahl Nitrogen*	-	-
Metals		
Dissolved Aluminum	X	X
Total Aluminum*	X	-
Dissolved Antimony	X	X
Total Antimony	X	X
Dissolved Arsenic	X	X
Total Arsenic	X	X
Dissolved Barium	-	-
Total Barium	-	-
Dissolved Beryllium	X	X
Total Beryllium	X	X
Dissolved Boron	-	X
Total Boron	-	-
Dissolved Cadmium*	X	X
Total Cadmium	X	X
Dissolved Chromium	X	X
Total Chromium	X	X

Table 2.3-25. (Continued).

	Transportation	Light Industrial
Metals (continued)		
Dissolved Chromium VI (Hexavalent)	X	X
Total Chromium VI (Hexavalent)	X	X
Dissolved Copper*	-	-
Total Copper	-	-
Dissolved Iron	X	-
Total Iron	-	-
Dissolved Lead*	X	X
Total Lead*	X	X
Dissolved Manganese	X	X
Total Manganese	X	X
Dissolved Mercury	X	X
Total Mercury*	X	X
Dissolved Nickel*	X	X
Total Nickel*	X	X
Dissolved Selenium	X	X
Total Selenium	X	X
Dissolved Silver	X	X
Total Silver	X	X
Dissolved Thallium	X	X
Total Thallium	X	X
Dissolved Zinc*	-	-
Total Zinc*	-	-
Semi-Volatile Organics		
Bis(2-ethylhexyl)phthalate*	O	O
Polycyclic Aromatic Hydrocarbons (PAHs)	O	O
Phenanthrene*	O	O
Pyrene*	O	O
All other PAHs	O	O
All other Semi-Volatile Organics	X	X
Pesticides		
Organochlorine Pesticides & Polychlorinated biphenyls (PCBs)	X	X
Carbofuran	X	X
Glyphosate	X	X
Organo-Phosphate Pesticides		
Diazinon*	X	X
Chlorpyrifos*	X	X
N- and P- Containing Pesticides		
Thiobencarb	X	
All other N- and P- Pesticides	X	X
Phenoxyacetic Acid Herbides		
2,4-D	X	X
2,4,5-TP	X	X
Bentazon	X	X

Notes:
X = less than 25% detection in ten consecutive samples
- = more than 25% detection in ten consecutive samples
O = less than 10 samples tested
* Constituent of concern for the Los Angeles Region
N = nitrogen
P = phosphorus

Source: LACDPW 2000a

The Dominguez Channel Monitoring Station (S28) is located at Artesia Boulevard and the Dominguez Channel in the City of Torrance (Figure 2.3-1). Two grab samples and one composite sample were collected at this station during the 2001-2002 storm season.

Chemical and toxicity analyses were conducted on the Dominguez Channel mass emission station sample. Chemistry analyses included the following constituent classes: conventional, indicator bacteria, general, metals, semi-volatile organics and pesticides. Toxicity analyses included the *Ceriodaphnia dubia* 7-day survival and reproduction tests and the *Strongylocentrotus purpuratus* (sea urchin) fertilization test. Toxicity analyses were performed as multi-concentration tests with sample concentrations of 100%, 56%, 32%, 18%, 10%, and 0% (N-control).

Toxicity testing is an effective tool for assessing the potential impact of complex mixtures of unknown pollutants on aquatic life in receiving water. Rather than performing chemical analysis on a sample for a host of compounds potentially toxic to aquatic life, this approach utilizes a laboratory test species to provide a direct measure of the toxicity of the sample. Interactions among the complex mixture of chemical and physical constituents can lead to additive or antagonistic effects, potentially causing an individual compound to become either more or less toxic than it would be were it isolated. While the potential effects of these interactions cannot be derived from simple chemical measurements, they are directly accounted for in toxicity tests.

If toxicity is detected, specialized toxicity identification evaluations (TIE) may be used to help characterize and identify constituent(s) causing toxicity. Toxicity testing can provide information on both potential short-term or "acute" effects as well as longer-term "chronic" effects. Historically toxicity tests, including TIEs, have been used to assess both short- and long-term impacts of point source discharges (e.g., POTW, power plant and industrial effluents) on aquatic life in a receiving water body. However, these tools can be applied to non-point source discharges, such as urban runoff. These discharges can contain a mixture of constituents and concentrations are often described as percentages of the test water mixed with control water.

Results of toxicity analysis fall into the following categories: no observed effect concentration (NOEC), 50% lethal concentration (LC_{50}), 50% inhibitory concentration (IC_{50}), and toxicity unit (TU). NOEC is the highest concentration causing no effect on the test organisms. LC_{50} is the concentration that produces 50% reduction in survival. IC_{50} is the concentration causing 50% inhibition in growth or reproduction. TU is defined as 100/(LC_{50} or IC_{50}). A TU value greater than or equal to 1 is considered substantially toxic and requires a toxicity identification evaluation (TIE) (LACDPW 2002). In order to get a TU of 1, either 50% of the organisms must die in the undiluted (100%) sample (LC_{50} =100%) or a sublethal endpoint must be inhibited by 50% in the undiluted (100%) sample (IC_{50} = 100%). This sublethal endpoint could be growth, reproduction, larval development, etc., depending upon the toxicity test used. A TU of greater than 1 would be derived by an LC_{50} or IC_{50} of less than 100%. For example, if a fifty percent reduction in survival was caused by a mixture of 75% sample mixed with 25% control, or clean water, than the LC_{50} would equal 75%, and the TU would be 1.3 (100/75).

According to the Ocean Plan, if the LC_{50} is greater than 100%, then the TU is calculated by the following formula: TU = log(100-S)/1.7, where S = percentage of survival in 100% sample. If S > 99%, the TU is reported as zero, which is the lowest TU value possible. This formula is for the calculation of a TUa (Toxicity Unit acute), which is used when the LC_{50} is less than 100%.

The sea urchin fertilization test for the Dominguez Channel station had an IC_{50} value of 52.63%, which equates to a TU value of 1.90. A TIE could not be conducted due to insufficient runoff and thus insufficient volume for the TIE analysis.

Table 2.3-26 presents the toxicity results from the 2001-2002 storm season (LACDPW 2002).

Table 2.3-26. Toxicity results for the Dominguez Channel mass emissions station 2001-2002.

Class Constituent	Units	Dominguez Channel
Chronic Ceriodaphnia Survival & Reproduction Bioassay		
Survival		
NOEC	%	100.00
TU		<1.00
LC25	%	>100.00
LC50	%	>100.00
Reproduction		
NOEC	%	100.00
TU		<1.00
LC25	%	>100.00
LC50	%	>100.00
Chronic Sea Urchin Fertilization Bioassay		
NOEC	%	18.00
TU		1.90
IC25	%	33.79
IC50	%	52.63

Notes:
IC_{50} = Concentration causing 50% inhibition in growth or reproduction
LC_{50} = Concentration causing 50% reduction in survival
NOEC = No observed effect concentration
TU = 100/LC_{50} or IC_{50}

LACDPW compared water quality chemistry results at the Dominguez Channel mass emission station to water quality objectives outlined in the Ocean Plan, Basin Plan, California Toxics Rule and AB411 standards. The following results were observed:

- Both grab samples collected had total coliform, fecal coliform and *Enterococcus* levels above AB411 standards.
- The ammonia level exceeded the Basin Plan water quality objectives during the composite sampling event.
- Dissolved copper levels exceeded Basin Plan water quality objectives and total copper levels exceeded Ocean Plan water quality objective during the event.
- The total zinc level exceeded the Ocean Plan water quality objective during the composite sampling event.

LACDPW estimated total pollutant loads due to storm water and urban runoff for the mass emission station. Table 2.3-27 presents the estimated pollutant loadings for the Dominguez Watershed for the 2001-2002 season.

Table 2.3-27. Estimated pollutant loading at the Dominguez Channel mass emission station 2001-2002.

Group	Constituent	Dominguez Channel Load (lbs)
Conventional	Chemical Oxygen Demand	41,830
	Total Dissolved Solids	132,096
	Total Suspended Solids	67,005
	Volatile Suspended Solids	18,187
	Methylene Blue Active Substances	143
	Total Organic Carbon	17,900
	Biochemical Oxygen Demand	15,603
	Cyanide	0
	Total Petroleum Hydrocarbons	0
	Oil and Grease	3,637
	Total Phenols	0
General Mineral	Ammonia	554
	Calcium	12,540
	Magnesium	3,905
	Potassium	3,408
	Sodium	19,049
	Bicarbonate	43,075
	Carbonate	0
	Chloride	19,623
	Fluoride	163
	Nitrate	2,106
	Sulfate	14,071
	Alkalinity	35,321
	Hardness	47,478
Nutrients	Dissolved Phosphorus	219
	Total Phosphorus	251
	NH3-Nitrogen	456
	Nitrate-Nitrogen	476
	Nitrite-Nitrogen	134
	Kjeldahl-Nitrogen	2,910
Metals	Dissolved Aluminum	0
	Total Aluminum	0
	Dissolved Antimony	2
	Total Antimony	3
	Dissolved Arsenic	2
	Total Arsenic	2
	Dissolved Barium	23
	Total Barium	34
	Dissolved Berylium	0
	Total Berylium	0
	Dissolved Boron	116
	Total Boron	138
	Dissolved Cadmium	0
	Total Cadmium	0
	Dissolved Chromium	1
	Total Chromium	3
	Dissolved Chromium VI (Hexavalent)	0
	Total Chromium VI (Hexavalent)	0
	Dissolved Copper	14
	Total Copper	36
	Dissolved Iron	0
	Total Iron	180

Table 2.3-27. (Continued).

Group	Constituent	Dominguez Channel Load (lbs)
Metals (Continued)	Dissolved Lead	0
	Total Lead	0
	Dissolved Manganese	0
	Total Manganese	0
	Dissolved Mercury	0
	Total Mercury	0
	Dissolved Nickel	4
	Total Nickel	5
	Dissolved Selenium	0
	Total Selenium	0
	Dissolved Silver	0
	Total Silver	0
	Dissolved Thallium	0
	Total Thallium	0
	Dissolved Zinc	104
	Total Zinc	104
Pesticides	Diazinon	0
	Chlorpyrifos	0
	Thiobencarb	0
Semi-Volatile Organics	Bis(2-ethylhexyl)phthalate	

0 = Data is below minimum level
Blank cells = No data available

Industrial Monitoring

Some of the major dischargers in the Dominguez Watershed are industrial and are primarily oil refineries such as Shell, Valero, Conoco-Phillips, BP, and Exxon Mobil (Figure 2.2-5, see Section 2.2.5.1). Equilon Enterprises LLC, a fuel pipeline transfer station, is also a major contributor. Other non-oil refining dischargers are TRW Incorporated, a manufacturer of semiconductors, electronic devices, and satellites and Praxair Incorporated, a cryogenic air-separation facility. These industrial dischargers have a substantial monitoring and reporting requirement.

Industrial facilities are required to have a regularly scheduled monitoring program, usually monthly or quarterly, with a report submitted to the regional board in addition to an annual summary report containing a discussion of the previous year's effluent and receiving water monitoring data.

Each industry has specific regulatory limitations for their effluent. Many have designated discharge levels to stay below as well as ranges to stay within, such as with pH and temperature. In order to comply with these regulations, each discharger has an effluent monitoring program.

As detailed in each discharger's effluent monitoring program, sampling stations are required to be established for each point of discharge in a location that is representative of the effluent being monitored. Quarterly, semiannual and annual effluent analyses are performed. Total flow, temperature, pH, conductivity, oil and grease, fecal coliform, suspended solids, and other organic and metal constituents are monitored at the varying frequencies. There may be several different lists of constituents to account for the different wastewaters within one industry. Acute and, in some cases, chronic toxicity tests are also conducted with additional requirements for quality assurance and accelerated monitoring which may lead to toxicity reduction evaluations (TREs) and toxicity identification evaluations (TIEs).

Most of these industries, as directed under the general NPDES permit to regulate discharge of storm water associated with industrial activity, have created and are implementing a Storm Water Pollution Prevention Plan (SWPPP) which state the best management practices (BMPs) for the discharger to follow in a storm event. In addition to, and as a part of this plan, most dischargers measure and record rainfall amounts every day. During at least one storm event per month that produces a significant discharge, visual observations are also recorded. The presence of floating and suspended materials, oil and grease, discoloration, turbidity, and odor are noted.

Similar to the effluent limitations, each industry has specific regulatory limitations for their receiving waters. Many have designated discharge levels to stay below as well as ranges to stay within, such as with pH, temperature and dissolved oxygen. Although each discharger has an effluent monitoring program, not all are asked to participate in receiving water monitoring programs.

The receiving water monitoring program consists of periodic surveys of the receiving water body (e.g., Dominguez Channel, Los Angeles Harbor, etc.) and includes studies of the physical-chemical characteristics of the receiving water that may be impacted by the discharges. Receiving waters are observed and sampled upstream of the effluent discharge point, outside the influence of the discharge, and, in some cases, one or more locations downstream (or with the tidal flow) of the effluent discharge point. Receiving waters are sampled during periods of discharge other than rainfall runoff. Many industries require sampling at least quarterly (some semi-annually), if possible, and have a specific list of constituents to test for, which may be different than their effluent monitoring list. Some industries require visual observations monthly, even though thorough testing is done less frequently. As part of the receiving water monitoring program, some industries have also implemented sediment sampling and monitoring programs (Figure 2.3-1). Specific stations are designated and samples are taken at a stated frequency (usually, semi-annually to annually). Another list of parameters are set and tested for under this program.

Pursuant to state regulations, dischargers are required to do interim monitoring in order to submit data sufficient for determination of priority pollutants that require water-quality based effluent limitations. The monitoring includes effluent sampling and at least semi-annually sampling of the receiving waters upstream of the effluent discharge point, usually once during dry weather and once during wet weather.

Several major dischargers along the lower portion of the Dominguez Channel conduct a coordinated sediment-monitoring program in the channel as part of their individual NPDES permits. Sediment samples are collected and analyzed from seven monitoring stations (Figure 2.3-1) on an annual basis. Grab samples of the upper two centimeters of sediment are collected at each station and analyzed for chronic toxicity, grain size, total organic carbon, total petroleum hydrocarbons, cadmium, chromium, copper, lead, nickel, zinc, PCBs, PAHs, DDT, odor and color. The results of this monitoring effort from 1994 to 2000 are included in Table 2.3-28.

Table 2.3-28. Results of sediment sampling along the Dominguez Channel (1994-2000).

Year	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Total Organic Carbon	Total Petroleum Hydrocarbons
1994	1-2	11-57	27-73	40-150	10-17	100-250	9800-41,000	76-540
1995	0.98-4	16-120	25-68	19-270	9-17	47-290	88-420	15-120
1996	<1.5	16-31	23-68	27-85	5-13	74-235	3780-8,140	44-494
1997	1-2	2-36	3-39	5-106	2-10	14-187	50-200	150-2,400
1998	0.6-1	6-32	19-43	31-84	6-10	110-190	3310-17,600	<10
1999	0.5-1.04	0.5-39	2.5-63	1-71	0.5-17	106-468	7300-27,000	<23
2000	0.5-1.2	19-36	24-190	17-86	8-17	61-280	8300-23,000	49-1,000

Note:
All units are expressed as mg/kg.

Source: ThermoRetec 2000

2.3.4.3 Water Quality Modeling in the Dominguez Watershed

LACDPW Pollutant Loading Model

LACDPW developed a GIS Pollutant Loading Model to provide data for watersheds that did not contain mass emission stations. The model uses existing data on drainage basins, land use, rainfall data, water quality results, and available geographic data. The model uses rainfall data to calculate the amount of runoff from the drainage area. The user can choose from over 257 individual constituents, or choose from preclassified groups such as general metals, pesticides, etc. The total pollutant load for the study area is then calculated using established event mean concentrations (EMCs) of the selected pollutants based on storm water sampling conducted by LACDPW and land use types. The model produces a report and maps of the study area (LACDPW 2000a).

EMCs were based on eight land use categories (light industrial, education, vacant, high-density single family residential, retail/commercial, multi-family residential, mixed residential, and transportation) (Figure 2.2-2, see Section 2.2). Thirty four land use types were defined by the Southern California Association of Governments (SCAG) and then divided into the eight land use categories by LACDPW. The education category contains schools. The high-density single family residential (HDSFR) category contains mobile homes and the HDSFR land use. The light industrial category contains communication, maintenance yards, land uses under construction, natural resources extract, utility facilities, heavy industrial, harbor facilities, and light industrial land uses. The multi-family residential (MFR) and the mixed residential categories include only the MFR and mixed residential land uses, respectively. The retail/commercial category contains the retail/commercial, general office, other commercial, institutional, military, marina facilities, mixed commercial/industrial, mixed urban, and other facilities land use types. The transportation category contains mixed transportation/utilities and the transportation land uses. The vacant category contains open space/recreational, vacant, urban vacant, low-density single family residential (LDSFR), golf courses, nurseries, agriculture, floodways, and animal husbandry land use types.

The Pollutant Loading Model is a static spreadsheet model and therefore has some limitations. However, it does provide an estimate of pollutant loading that can be useful in assessing long-term trends and receiving water impacts.

Estimated seasonal mass pollutant loads were calculated for six years starting with the 1994-1995 storm season and ending with the 1999-2000 storm season (LACDPW 2000a). During this time frame, loads varied among years and were greatest during the 1997-1998 El Niño season. Suspended solids had the highest loads, ranging from 6.32 to 41.5 million pounds. The highest dissolved metals loads were associated with copper (783 to 2,210 pounds) and zinc (4,960 to 57,900 pounds). Total copper (1,300 to 8,090 pounds) and zinc (15,500 to 93,100 pounds) loads were two or more times the dissolved loads. Dissolved lead loads (2,040 pounds) were available for only the 1997-1998 El Niño season; however, total lead loads were available for all six storm seasons and ranged from 251 to 5,180 pounds (1987-1988 season). Loads also were estimated for several nutrients, but unlike metals had highest estimated loads during the 1995-1996 storm season. Dissolved and total phosphorus loads ranged from 17,400 to 32,400 pounds and 20,600 to 695,000 pounds, respectively. Nitrogen in the form of ammonia (34,800 to 71,600 pounds), nitrate (48,100 to 167,000 pounds), nitrite (5,890 to 1,650,000 pounds), and total kjeldahl nitrogen (201,000 to 1,450,000) generally represented the highest nutrient loads.

New Model Results

The Pollutant Loading Model was run again for the development of this document. Model runs were made for the entire Dominguez Watershed and individually for each of the five subwatersheds including: Upper Dominguez, Dominguez Estuary, Los Angeles and Long Beach Harbors, Machado Lake, and Retention Basins.

Storm volumes vary from year to year and for each storm event. The following rainfall depths are averages based on LACDPW rain gauges and are presented for given frequency storm events:

- One-year storm event = 1.9 centimeters (0.75 inches)
- Two-year storm event = 5.1 centimeters (2.01 inches)
- Fifty-year storm event = 12.8 centimeters (5.03 inches)
- One hundred-year storm event = 14.3 centimeters (5.62 inches)

Runoff volume entered for all model runs was based on the average one-year storm event for the region (1.9 centimeters [0.75 inches]). This storm event total is averaged from LACDPW rain gauges and is also the rainfall total regulated in the County of Los Angeles Standard Urban Storm Water Mitigation Plan (SUSMP), which represents the 85th percentile storm for the Los Angeles area.

Table 2.3-29 present the EMCs and pollutant loading results for the total watershed as well as all subwatersheds within the Dominguez Watershed. Results followed similar trends as the previous model results; however, the estimated loads were substantially lower with the new model runs. This result was expected since the newly estimated pollutant loads were based on average rainfall associated with a one-year storm event; whereas, the previous model results estimated total pollutant loads for an entire season. Total suspended solids accounted for the greatest loads with 1.06 million pounds estimated for an average one-year storm event for the entire watershed, which was about 1/6th of the lowest total seasonal load previously estimated. Suspended solids loads (258,646 to 367,576 pounds) were highest for the Dominguez Channel (upper and estuary) and Los Angeles-Long Beach Harbors Subwatersheds. Similar to previous model results, total metal loads were about twice the dissolved metal loads. Total zinc (2,310 pounds) loads were an order of magnitude greater than copper (203 pounds) and lead (84 pounds) loads. The estimated loads for an average one-year storm event for copper and zinc were approximately 1/6th of the lowest total seasonal load previously estimated; whereas, the estimated load for lead was approximately ½ of the lowest total seasonal load previously estimated. Similar to the trend for total suspended solids, the Dominguez Channel (upper and estuary) and Los Angeles-Long Beach Harbors Subwatersheds had the highest estimated loads of metals. Nutrient loads for an average one-year storm event ranged from one or more orders of magnitude lower than previous total seasonal load estimates. Nitrogen loads in the form of ammonia (3,595 pounds), nitrate (6,855 pounds), nitrite (728 pounds), and total kjeldahl nitrogen (20,863 pounds) were higher than dissolved phosphorous (2,091 pounds) loads. Nutrient loads were highest for the Dominguez Channel (upper and estuary) and Los Angeles-Long Beach Harbors Subwatersheds.

Table 2.3-29. Estimated pollutant loading for Dominguez Subwatersheds.

Total Dominguez Watershed

Land Use Category Used	Dissolved-Phosphorus		Kjeldahl-Nitrogen		Ammonia-Nitrogen		Nitrate-Nitrogen		Nitrite-Nitrogen		Total Suspended Solids		Total-Phosphorus		Dissolved Copper		Dissolved Zinc		Total Copper		Total Lead		Total Zinc	
	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load
Education	0.27	90.2	1.62	541.1	0.26	86.8	0.63	210.4	0.08	26.7	103.02	34410.4	0.31	103.5	0.0128	4.3	0.06597	22.0	0.02149	7.2	0.00453	1.5	0.12369	41.3
HDSFR	0.29	532.3	2.8	5139.4	0.36	660.8	1.04	1908.9	0.09	165.2	104.65	192086.7	0.39	715.9	0.00844	15.5	0.03911	71.8	0.0153	28.1	0.00959	17.6	0.08035	147.5
Light Industrial	0.28	780.5	3.07	8557.7	0.48	1338.0	0.86	2397.3	0.09	250.9	229.37	639376.5	0.44	1226.5	0.02022	56.4	0.46019	1282.8	0.03104	86.5	0.01487	41.5	0.5656	1576.6
MFR	0.16	77.2	1.86	897.3	0.38	183.3	1.73	834.5	0.08	38.6	46.35	22359.1	0.19	91.7	0.00675	3.3	0.07536	36.4	0.01223	5.9	0.00513	2.5	0.13488	65.1
Mixed Residential	0.2	58.1	2.7	783.9	0.58	168.4	0.71	206.1	0.1	29.0	69.06	20049.7	0.26	75.5	0.01152	3.3	0.12583	36.5	0.01733	5.0	0.0087	2.5	0.18485	53.7
Retail/Commercial	0.3	332.3	3.37	3732.4	0.91	1007.9	0.58	642.4	0.14	155.1	67.4	74648.1	0.41	454.1	0.0146	16.2	0.16412	181.8	0.03477	38.5	0.01153	12.8	0.23853	264.2
Trans	0.36	208.9	1.81	1050.1	0.23	133.4	0.75	435.1	0.09	52.2	75.35	43714.8	0.44	255.3	0.03268	19.0	0.20389	118.3	0.05186	30.1	0.00908	5.3	0.27945	162.1
Vacant	0.06	11.9	0.81	161.0	0.08	15.9	1.11	220.6	0.05	9.9	164.68	32732.2	0.11	21.9		0.0		0.0	0.00912	1.8		0.0		0.0
		2091.3		**20862.9**		**3594.5**		**6855.4**		**727.6**		**1059377.5**		**2944.3**		**117.9**		**1749.6**		**203.1**		**83.6**		**2310.5**

Upper Dominguez Subwatershed

Land Use Category Used	Dissolved-Phosphorus		Kjeldahl-Nitrogen		Ammonia -Nitrogen		Nitrate-Nitrogen		Nitrite-Nitrogen		Total Suspended Solids		Total-Phosphorus		Dissolved Copper		Dissolved Zinc		Total Copper		Total Lead		Total Zinc	
	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load
Education	0.27	36.4	1.62	218.6	0.26	35.1	0.63	85.0	0.08	10.8	103.02	13901.4	0.31	41.8	0.0128	1.7	0.06597	8.9	0.02149	2.9	0.00453	0.6	0.12369	16.7
HDSFR	0.29	186.1	2.8	1796.9	0.36	231.0	1.04	667.4	0.09	57.8	104.65	67158.6	0.39	250.3	0.00844	5.4	0.03911	25.1	0.0153	9.8	0.00959	6.2	0.08035	51.6
Light Industrial	0.28	120.3	3.07	1319.4	0.48	206.3	0.86	369.6	0.09	38.7	229.37	98578.2	0.44	189.1	0.02022	8.7	0.46019	197.8	0.03104	13.3	0.01487	6.4	0.5656	243.1
MFR	0.16	37.5	1.86	435.6	0.38	89.0	1.73	405.2	0.08	18.7	46.35	10854.9	0.19	44.5	0.00675	1.6	0.07536	17.6	0.01223	2.9	0.00513	1.2	0.13488	31.6
Mixed Residential	0.2	38.0	2.7	513.3	0.58	110.3	0.71	135.0	0.1	19.0	69.06	13129.2	0.26	49.4	0.01152	2.2	0.12583	23.9	0.01733	3.3	0.0087	1.7	0.18485	35.1
Retail/Commercial	0.3	125.8	3.37	1413.5	0.91	381.7	0.58	243.3	0.14	58.7	67.4	28269.3	0.41	172.0	0.0146	6.1	0.16412	68.8	0.03477	14.6	0.01153	4.8	0.23853	100.0
Transportation	0.36	102.9	1.81	517.3	0.23	65.7	0.75	214.3	0.09	25.7	75.35	21533.4	0.44	125.7	0.03268	9.3	0.20389	58.3	0.05186	14.8	0.00908	2.6	0.27945	79.9
Vacant	0.06	1.9	0.81	25.7	0.08	2.5	1.11	35.2	0.05	1.6	164.68	5221.1	0.11	3.5		0.0		0.0	0.00912	0.3		0.0		0.0
		649.0		**6240.2**		**1121.6**		**2155.0**		**231.0**		**258645.9**		**876.3**		**35.1**		**400.5**		**61.9**		**23.4**		**558.0**

Notes:
EMC = Event mean concentration (mg/L)
Load = Pollutant loading (lbs)
HDSFR = High density single family residence
MFR = Multi-family residence

Table 2.3-29. (Continued).

Dominguez Estuary Subwatershed

Land Use Category Used	Dissolved-Phosphorus		Kjeldahl-Nitrogen		Ammonia-Nitrogen		Nitrate-Nitrogen		Nitrite-Nitrogen		Total Suspended Solids		Total-Phosphorus		Dissolved Copper		Dissolved Zinc		Total Copper		Total Lead		Total Zinc	
	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load
Education	0.27	23.6	1.62	141.7	0.26	22.7	0.63	55.1	0.08	7.0	103.02	9013.2	0.31	27.1	0.0128	1.1	0.06597	5.8	0.02149	1.9	0.00453	0.4	0.12369	10.8
HDSFR	0.29	120.9	2.8	1167.5	0.36	150.1	1.04	433.6	0.09	37.5	104.65	43634.3	0.39	162.6	0.00844	3.5	0.03911	16.3	0.0153	6.4	0.00959	4.0	0.08035	33.5
Light Industrial	0.28	333.2	3.07	3653.3	0.48	571.2	0.86	1023.4	0.09	107.1	229.37	272952.5	0.44	523.6	0.02022	24.1	0.46019	547.6	0.03104	36.9	0.01487	17.7	0.5656	673.1
MFR	0.16	9.4	1.86	109.1	0.38	22.3	1.73	101.5	0.08	4.7	46.35	2719.6	0.19	11.1	0.00675	0.4	0.07536	4.4	0.01223	0.7	0.00513	0.3	0.13488	7.9
Mixed Residential	0.2	3.8	2.7	51.6	0.58	11.1	0.71	13.6	0.1	1.9	69.06	1320.9	0.26	5.0	0.01152	0.2	0.12583	2.4	0.01733	0.3	0.0087	0.2	0.18485	3.5
Retail/Commercial	0.3	77.7	3.37	872.7	0.91	235.7	0.58	150.2	0.14	36.3	67.4	17454.7	0.41	106.2	0.0146	3.8	0.16412	42.5	0.03477	9.0	0.01153	3.0	0.23853	61.8
Transportation	0.36	56.8	1.81	285.5	0.23	36.3	0.75	118.3	0.09	14.2	75.35	11885.3	0.44	69.4	0.03268	5.2	0.20389	32.2	0.05186	8.2	0.00908	1.4	0.27945	44.1
Vacant	0.06	3.1	0.81	42.3	0.08	4.2	1.11	57.9	0.05	2.6	164.68	8595.2	0.11	5.7		0.0		0.0	0.00912	0.5		0.0		0.0
		628.6		**6323.8**		**1053.6**		**1953.7**		**211.3**		**367575.7**		**910.8**		**38.3**		**651.2**		**63.9**		**27.0**		**834.7**

Los Angeles – Long Beach Harbors Subwatershed

Land Use Category Used	Dissolved-Phosphorus		Kjeldahl-Nitrogen		Ammonia -Nitrogen		Nitrate-Nitrogen		Nitrite-Nitrogen		Total Suspended Solids		Total-Phosphorus		Dissolved Copper		Dissolved Zinc		Total Copper		Total Lead		Total Zinc	
	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load
Education	0.27	8.1	1.62	48.6	0.26	7.8	0.63	18.9	0.08	2.4	103.02	3089.0	0.31	9.3	0.0128	0.4	0.06597	2.0	0.02149	0.6	0.00453	0.1	0.12369	3.7
HDSFR	0.29	71.8	2.8	693.7	0.36	89.2	1.04	257.6	0.09	22.3	104.65	25925.7	0.39	96.6	0.00844	2.1	0.03911	9.7	0.0153	3.8	0.00959	2.4	0.08035	19.9
Light Industrial	0.28	272.7	3.07	2990.1	0.48	467.5	0.86	837.6	0.09	87.7	229.37	223397.2	0.44	428.5	0.02022	19.7	0.46019	448.2	0.03104	30.2	0.01487	14.5	0.5656	550.9
MFR	0.16	10.6	1.86	123.8	0.38	25.3	1.73	115.1	0.08	5.3	46.35	3083.8	0.19	12.6	0.00675	0.4	0.07536	5.0	0.01223	0.8	0.00513	0.3	0.13488	9.0
Mixed Residential	0.2	10.7	2.7	145.1	0.58	31.2	0.71	38.1	0.1	5.4	69.06	3710.1	0.26	14.0	0.01152	0.6	0.12583	6.8	0.01733	0.9	0.0087	0.5	0.18485	9.9
Retail/Commercial	0.3	42.5	3.37	477.6	0.91	129.0	0.58	82.2	0.14	19.8	67.4	9552.5	0.41	58.1	0.0146	2.1	0.16412	23.3	0.03477	4.9	0.01153	1.6	0.23853	33.8
Transportation	0.36	25.1	1.81	126.1	0.23	16.0	0.75	52.3	0.09	6.3	75.35	5249.8	0.44	30.7	0.03268	2.3	0.20389	14.2	0.05186	3.6	0.00908	0.6	0.27945	19.5
Vacant	0.06	3.1	0.81	41.9	0.08	4.1	1.11	57.4	0.05	2.6	164.68	8517.2	0.11	5.7		0.0		0.0	0.00912	0.5		0.0		0.0
		444.7		**4646.7**		**770.1**		**1459.3**		**151.7**		**282525.3**		**655.5**		**27.6**		**509.1**		**45.4**		**20.1**		**646.7**

Notes:
EMC = Event mean concentration (mg/L)
Load = Pollutant loading (lbs)
HDSFR = High density single family residence
MFR = Multi-family residence

Table 2.3-29. (Continued).

Machado Lake Subwatershed

Land Use Category Used	Dissolved-Phosphorus		Kjeldahl-Nitrogen		Ammonia -Nitrogen		Nitrate-Nitrogen		Nitrite-Nitrogen		Total Suspended Solids		Total-Phosphorus		Dissolved Copper		Dissolved Zinc		Total Copper		Total Lead		Total Zinc	
	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load
Education	0.27	17.3	1.62	103.9	0.26	16.7	0.63	40.4	0.08	5.1	103.02	6606.5	0.31	19.9	0.0128	0.8	0.06597	4.2	0.02149	1.4	0.00453	0.3	0.12369	7.9
HDSFR	0.29	122.2	2.8	1179.5	0.36	151.7	1.04	438.1	0.09	37.9	104.65	44084.1	0.39	164.3	0.00844	3.6	0.03911	16.5	0.0153	6.4	0.00959	4.0	0.08035	33.8
Light Industrial	0.28	47.0	3.07	515.8	0.48	80.6	0.86	144.5	0.09	15.1	229.37	38538.9	0.44	73.9	0.02022	3.4	0.46019	77.3	0.03104	5.2	0.01487	2.5	0.5656	95.0
MFR	0.16	14.0	1.86	163.0	0.38	33.3	1.73	151.6	0.08	7.0	46.35	4061.0	0.19	16.6	0.00675	0.6	0.07536	6.6	0.01223	1.1	0.00513	0.4	0.13488	11.8
Mixed Residential	0.2	5.1	2.7	68.2	0.58	14.7	0.71	17.9	0.1	2.5	69.06	1745.3	0.26	6.6	0.01152	0.3	0.12583	3.2	0.01733	0.4	0.0087	0.2	0.18485	4.7
Retail/Commercial	0.3	48.6	3.37	545.7	0.91	147.4	0.58	93.9	0.14	22.7	67.4	10914.1	0.41	66.4	0.0146	2.4	0.16412	26.6	0.03477	5.6	0.01153	1.9	0.23853	38.6
Transportation	0.36	16.2	1.81	81.2	0.23	10.3	0.75	33.7	0.09	4.0	75.35	3381.1	0.44	19.7	0.03268	1.5	0.20389	9.1	0.05186	2.3	0.00908	0.4	0.27945	12.5
Vacant	0.06	3.5	0.81	47.3	0.08	4.7	1.11	64.8	0.05	2.9	164.68	9610.5	0.11	6.4		0.0		0.0	0.00912	0.5		0.0		0.0
		273.8		**2704.6**		**459.3**		**984.9**		**97.3**		**118941.4**		**373.9**		**12.5**		**143.5**		**23.0**		**9.8**		**204.5**

Retention Basin Subwatersheds

Land Use Category Used	Dissolved-Phosphorus		Kjeldahl-Nitrogen		Ammonia -Nitrogen		Nitrate-Nitrogen		Nitrite-Nitrogen		Total Suspended Solids		Total-Phosphorus		Dissolved Copper		Dissolved Zinc		Total Copper		Total Lead		Total Zinc	
	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load	EMC	Load
Education	0.27	4.7	1.62	28.3	0.26	4.5	0.63	11.0	0.08	1.4	103.02	1800.1	0.31	5.4	0.0128	0.2	0.06597	1.2	0.02149	0.4	0.00453	0.1	0.12369	2.2
HDSFR	0.29	31.3	2.8	301.9	0.36	38.8	1.04	112.1	0.09	9.7	104.65	11282.3	0.39	42.0	0.00844	0.9	0.03911	4.2	0.0153	1.6	0.00959	1.0	0.08035	8.7
Light Industrial	0.28	6.6	3.07	72.1	0.48	11.3	0.86	20.2	0.09	2.1	229.37	5385.6	0.44	10.3	0.02022	0.5	0.46019	10.8	0.03104	0.7	0.01487	0.3	0.5656	13.3
MFR	0.16	5.7	1.86	65.8	0.38	13.4	1.73	61.2	0.08	2.8	46.35	1639.7	0.19	6.7	0.00675	0.2	0.07536	2.7	0.01223	0.4	0.00513	0.2	0.13488	4.8
Mixed Residential	0.2	0.4	2.7	5.6	0.58	1.2	0.71	1.5	0.1	0.2	69.06	144.0	0.26	0.5	0.01152	0.0	0.12583	0.3	0.01733	0.0	0.0087	0.0	0.18485	0.4
Retail/Commercial	0.3	27.7	3.37	310.9	0.91	84.0	0.58	53.5	0.14	12.9	67.4	6218.3	0.41	37.8	0.0146	1.3	0.16412	15.1	0.03477	3.2	0.01153	1.1	0.23853	22.0
Transportation	0.36	5.8	1.81	29.0	0.23	3.7	0.75	12.0	0.09	1.4	75.35	1209.1	0.44	7.1	0.03268	0.5	0.20389	3.3	0.05186	0.8	0.00908	0.1	0.27945	4.5
Vacant	0.06	0.3	0.81	3.8	0.08	0.4	1.11	5.2	0.05	0.2	164.68	767.6	0.11	0.5		0.0		0.0	0.00912	0.0		0.0		0.0
		82.4		**817.4**		**157.3**		**276.7**		**30.8**		**28446.6**		**110.5**		**3.7**		**37.5**		**7.3**		**2.9**		**55.8**

Notes:
EMC = Event mean concentration (mg/L)
Load = Pollutant loading (lbs)
HDSFR = High density single family residence
MFR = Multi-family residence

SCCWRP Dynamic Wet Weather Runoff Model

The Southern California Coastal Water Research Project (SCCWRP) is working with the Lawrence Livermore National Laboratory (LLNL) and other stakeholders to develop a dynamic wet weather runoff model for the Dominguez Watershed.

In coordination with SCCWRP, the Ports of Los Angeles and Long Beach conducted water quality sampling for the wet weather model development. Monitoring was conducted during the 2001-2002 and 2002-2003 storm seasons. Two monitoring stations were located within each Port District: The Port of Long Beach monitored two container terminal land use sites at Pier A and Pier T (Figure 2.3-16). The Port of Los Angeles monitored a mixed commercial land use site at the Maritime Museum in San Pedro and a mixed land use site along the Torrance Lateral in the City of Carson. SCCWRP has also monitored a mixed industrial site in the City of Carson at the intersection of Wilmington Avenue and 220th Street.

Multiple water quality samples were collected throughout the entire storm to validate the model. The following parameters were sampled at each time interval during the storm: chlorinated hydrocarbons, indicator bacteria, PAHs, nutrients and trace metals.

2.3.4.4 Special Studies/Sites within the Dominguez Watershed

Superfund Sites

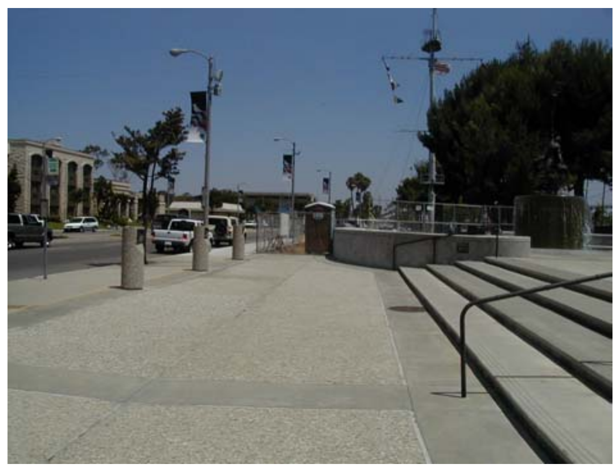
As previously mentioned in Section 2.1.3.3, the Dominguez Watershed contains two Superfund sites: the Montrose Chemical Corporation site and the Del Amo site. Groundwater contamination from the Montrose site has merged with the groundwater contamination from the Del Amo Rubber Facility Site. EPA has chosen to create a dual-site operable unit in which a single remedial action will address the groundwater contamination for both sites. The pure form of chlorobenzene is considered a non-aqueous phase liquid (NAPL) and is the form that is prevalent under the Montrose plant property. Groundwater in the vicinity of the NAPL cannot be cleaned up because the NAPL continues to dissolve in it, and if not treated, would continue to contaminate it for hundreds of years. The strategy of EPA's cleanup remedy is to contain the water near the NAPL, so that the contamination cannot spread, and then clean up the groundwater outside the containment zone to drinking water standards. The contamination from the Del Amo site includes 12 areas of concern, but EPA is focusing on the XMW-20 NAPL and a waste pit area. XMW-20 NAPL is composed of 90 percent benzene with toluene, ethylbenzene, and styrene as other components. Groundwater near the XMW-20 NAPL has benzene levels up to 1,200,000 μg/L. Soils located under the waste pit area have come to be located below the top of the water table due to rising groundwater levels. Currently, this groundwater in not used as a source of drinking water, although there are 17 municipal drinking water wells within four miles of the Del Amo site. The EPA is in the process of designing a groundwater cleanup system for the area (USEPA 2003).

In addition to the groundwater remediation already discussed, there are two other long-term remedial phases of the Del Amo site focusing on the Waste Pit area and the remaining soils of the former facility. In 1984, contamination was discovered in a waste pit disposal area and consists of six disposal pits and two evaporation ponds. Hazardous substances in the waste remain in the pits and ponds, which are currently covered with fill material, weeds, and miscellaneous debris. The waste pit disposal area is now capped with a Resource Conservation and Recovery Act (RCRA)-equivalent cap and that portion of the property is undeveloped. The rest of the area has been redeveloped as an industrial park (USEPA 2003).

Pier A

Pier T

Torrance Lateral



Maritime Museum

Figure 2.3-16. Photographs of Port monitoring stations.

Bacteria

The Dominguez Channel is on the 303(d) List of Impaired Water Bodies for high coliform bacteria counts. As a result, the RWQCB is developing a TMDL for coliform bacteria for Dominguez Channel (above Vermont) and Dominguez Channel Estuary (below Vermont). During June 2002, the LARWQCB conducted bacteriological sampling along the Dominguez Channel in support of the TMDL program.

There were a total of fifty-one samples collected over the two-day period. Fifteen samples were collected along the downstream estuary section of the channel and thirty-six samples were collected along the upstream section (Figure 2.3-17).

Samples collected along the downstream estuary section (below Vermont) included nine samples within the Dominguez Channel, two samples in the Torrance Lateral, and the remaining four samples from outfalls and/or laterals flowing into the channel. The samples taken from within the channel consisted of three cross-sectional areas, taken at three separate bridges. The cross-sections consisted of samples collected from both sides of the channel and from the channel center. Samples collected along the upstream section of Dominguez Channel (above Vermont) included six samples collected from the channel center and thirty samples collected from side channels or pipes.

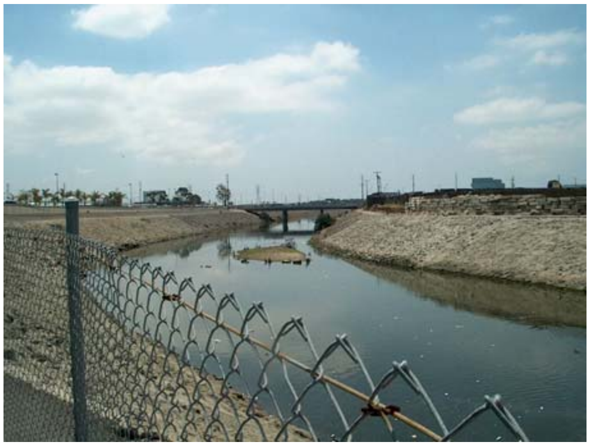
Figures 2.3-18 through 2.3-20 present the results of the study. The bacteria levels are displayed spatially by sampling location and color-coded by intensity. Results falling in the lower ranges are indicated by blue to green dots. Results falling in the mid-range of the scale are indicated by yellow and orange dots. Results at the higher end of the scale are indicated by pink to red dots (MEC 2002a).

Total coliform levels ranged from 42 most probable number (MPN)/100mL to 5,172,000 MPN/100mL. Fecal coliform levels ranged from 45 CFU/100mL to 4,550,000 CFU/100mL. Enterococci levels ranged from 47 MPN/100mL to 410,600 MPN/100mL. These results are classified as preliminary and have not had a thorough quality assurance/quality control (QA/QC) review by Regional Board personnel.

The following results were observed from the study:

- Bacteria levels from in-channel samples at the headwaters were elevated.
- Bacteria levels dropped rapidly over the next two downstream miles of the Channel, then began to rise again until they leveled off when they reached the beginning of the estuary. This may be due to a chlorinated discharge between these locations.
- Coliform levels in the estuary dropped as distance downstream increased and salinity levels increased.
- *Enterococcus* levels remained fairly stable throughout the channel and with the exception of a few outliers the range stayed within a factor of 100.
- In-channel bacteria levels were relatively lower than lateral bacteria levels, which were lower than headwater bacteria levels. *Enterococcus* was the only exception, with lateral and headwater bacteria levels showing greater similarity.

  Estuary bacteria levels were lowers than in-channel due to the saline environment.



Dominguez Channel below Vermont

Dominguez Channel above Vermont

Torrance Lateral

Del Amo Lateral

Figure 2.3-17. Typical views of bacteria sampling stations, June 2002.

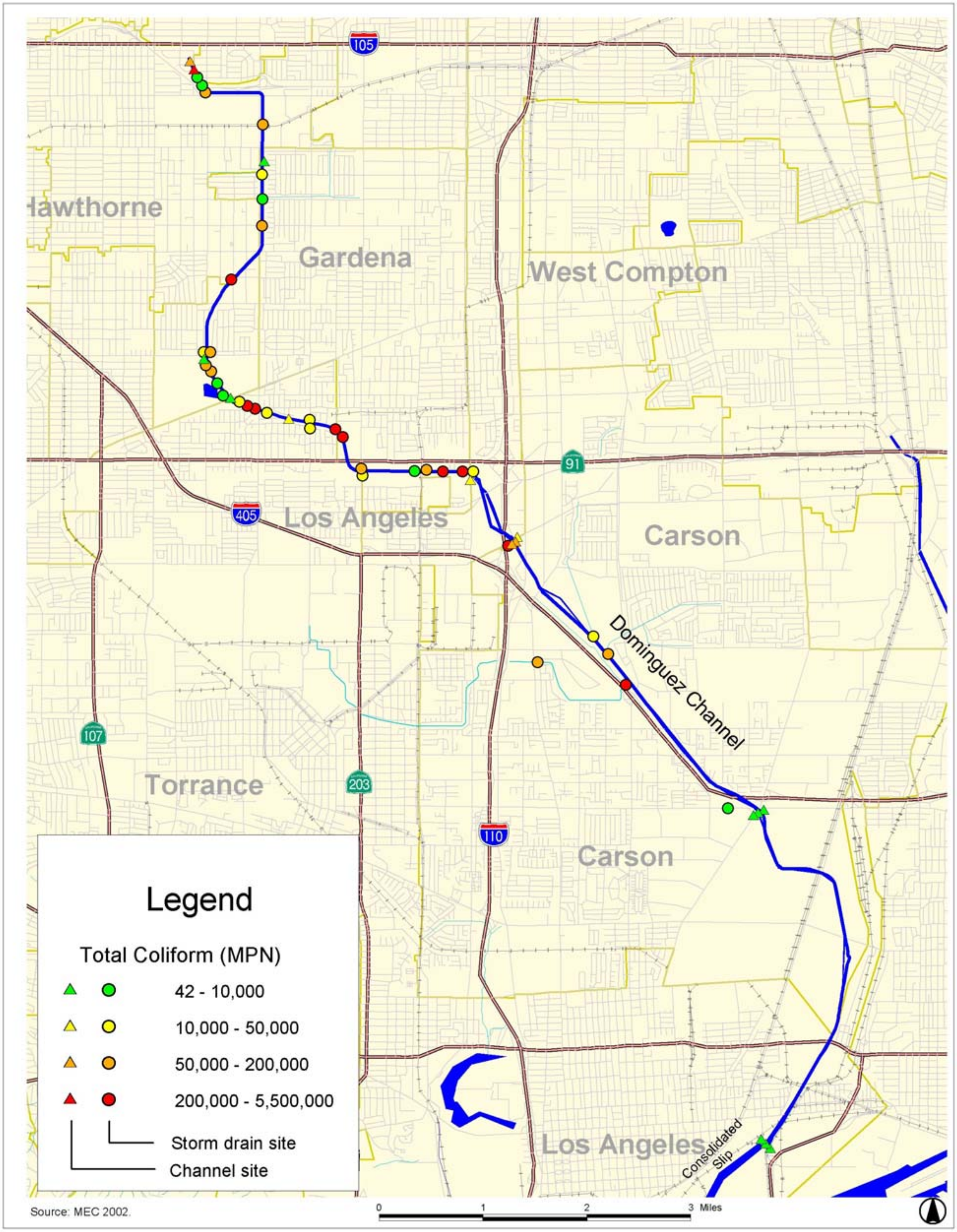


Figure 2.3-18. Total coliform counts within the Dominguez Channel, June 2002.

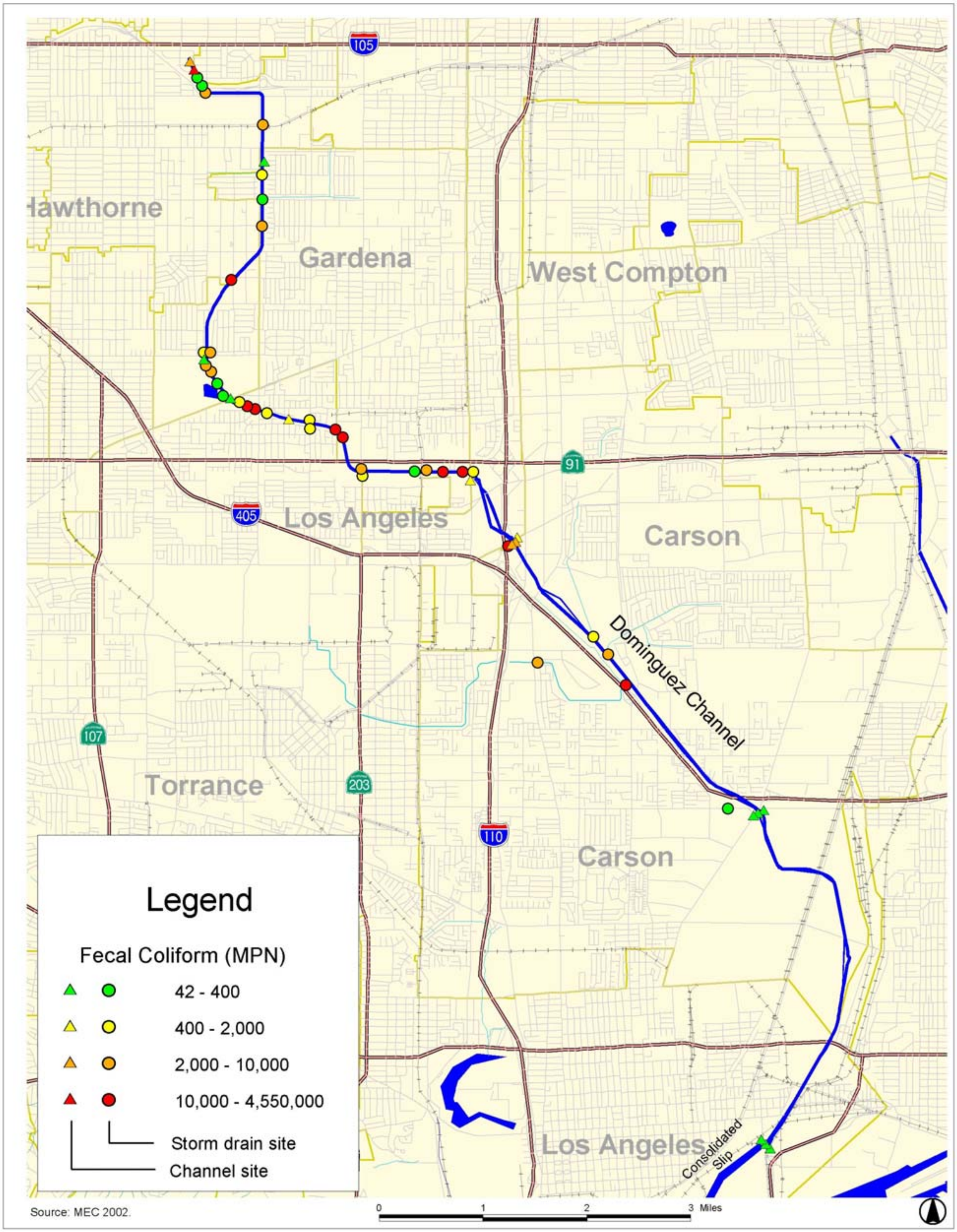


Figure 2.3-19. Fecal coliform counts within the Dominguez Channel, June 2002.

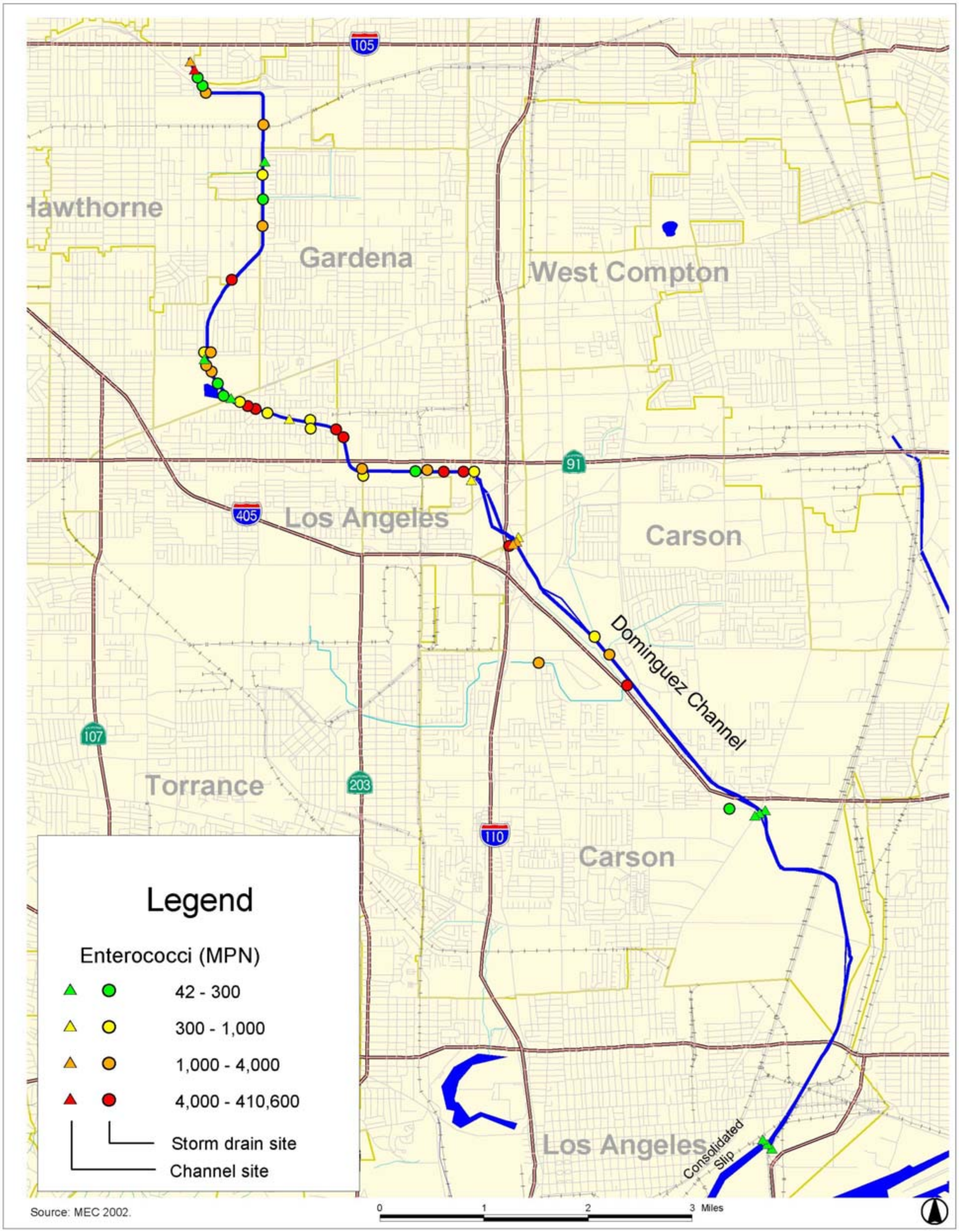


Figure 2.3-20. ***Enterococcus*** **counts within the Dominguez Channel, June 2002.**

It is important to understand that bacteriological conditions at a given site can change dramatically throughout time.

The LARWQCB has also compiled bacteriological sampling data from Long Beach Department of Health Services. Samples were collected throughout the harbor area. Table 2.3-30 presents a summary of these results and the percentage of AB411 criteria exceedances.

Table 2.3-30. Summary of bacterial monitoring results for Long Beach Harbor, April 1999 to April 2001.

	Geometric Mean	Maximum Value	AB411 Limit	% AB411 Exceeded
Fecal Coliform (MPN/100mL)	57	12,033	400	11%
Total Coliform (MPN/100mL)	354	24,192	10,000*	13%
Enterococcus (MPN/100mL)	30	2,005	104	16%

Note:
* Limit is 1,000 if fecal coliforms represent more the 10% of total coliforms
Source: LARWQCB from Long Beach DHS

Sediment

A consultant for the Montrose Chemical Company conducted sediment sampling for DDT in the Dominguez Channel during 1990. They detected DDT levels of 300 to 13,000 parts per billion (ppb) in the Channel. The EPA provided a comparison of the data with National Oceanic Atmospheric Administration (NOAA) "identified concentrations of DDT in sediment associated with adverse impacts". NOAA's information noted a sediment concentration of 3 ppb was associated with adverse impacts in 10 percent (ER-L) of the data reviewed and a level of 350 ppb was associated with adverse impacts in 50 percent (ER-M) of the data reviewed. EPA stated to Montrose that adverse impacts to the biological community of Dominguez Channel and Consolidated Slip would be expected based on the measured concentrations (LARWQCB 2001b).

Another pollutant of concern for the Dominguez Channel is zinc chromate. It was used as an industrial additive for cooling water/boiler blowdown in the 1980s. The LARWQCB conducted sediment sampling in the Channel in 1988 and found zinc levels up to 447 parts per million (ppm), chromium levels up to 67 ppm, and lead levels up to 231 ppm (LARWQCB 2001b).

Aquatic Species

The LARWQCB conducted a study of Dominguez Channel in 1975, which reported that the aquatic biota of the Channel were mainly marine in origin and were a continuation of the Los Angeles Inner Harbor biota. While somewhat dated, the report noted that the number and abundance of aquatic species declined the further inland the distance from the harbor increased. The study considered the absence of benthic fish species near an oil refinery to be indicative of an oxygen deprived benthic environment. They also attributed an abrupt decline in benthic species between Alameda and Wilmington Streets to the effects of pollution. One of the most abundant species found during the study was *Capitella capitata* (polychaete worm), which is generally associated with disturbed and/or polluted areas (LARWQCB 2001). No more recent studies of aquatic species have been identified for the Dominguez Channel.

2.3.4.5 Los Angeles and Long Beach Harbors and Consolidated Slip

The Port of Los Angeles and Port of Long Beach harbor complex is located within San Pedro Bay. From the late 1800s to the mid 1900s, development converted the natural estuarine and shallow near-shore marine habitats into deepwater marine habitat that is protected from wave action by a series of offshore breakwaters (MEC 2002b). The harbor is divided into an outer harbor area of open water and an inner harbor with an extensive system of shipping channels, basins, commercial cargo terminals, and marinas. The entire system is open to tidal exchange through gaps in the breakwater and a channel connection between the two ports. Los Angeles Harbor receives fresh water through the Dominguez Channel at Consolidated Slip, which drains approximately 20,720 square hectares (80 square miles) of urban and industrial areas (USACE 2000). The Los Angeles River and the Terminal Island Treatment Plant discharge to the Long Beach Outer Harbor.

Sediments in the harbor are dominated by fine particles (particle diameter < 62 microns), primarily silty sand with varying proportions of sand, silt, and clays (LAHD 2002). Sediment depth ranges from zero in areas of exposed bedrock (associated with the Palos Verdes Fault) to nearly 305 meters (1,000 feet) at the breakwater. Recent sediments have been deposited in the channels and basins (LAHD 1980 cited in LAHD 2002). This sediment is easily disturbed by currents and ship traffic and tends to be dispersed toward the margins of the channels and basins. Industrial development in the harbor and inland areas has contributed substantial amounts of pollutants, which have bonded onto the fine-grained sediments.

The Los Angeles and Long Beach Harbors are defined as enclosed bays in the California Ocean Plan (SWRCB 1997) and therefore are subject to the water quality objectives for inland surface waters as specified in Water Quality Control Plan for the Los Angeles Region (LARWQCB 1994). These objectives define the maximum concentrations various constituents (i.e., inorganic chemicals) may reach and describe levels other water quality parameters (i.e., temperature) are allowed in order to prevent any adverse impact on designated beneficial uses.

The inner and outer Los Angeles Harbor areas have been designated with beneficial uses for navigation, contact and non-contact water recreation, commercial and sport fishing marine habitat and rare, threatened and endangered species. They have also been designated with the potential use of shellfish harvesting (LARWQCB 1994).

The water quality of the Los Angeles and Long Beach Harbors was evaluated in a recent (2000) survey by MEC Analytical Systems, Inc. (MEC 2002b). Quarterly monitoring was conducted to assess spatial and temporal changes of five primary water quality parameters, temperature, salinity, dissolved oxygen (DO), acidity/alkalinity (pH) and water clarity (transmissivity). *In-situ* measurements were collected at 34 stations within the harbors and Consolidated Slip. At each station, three measurements were taken throughout the water column at the surface, mid-depth, and near bottom. Table 2.3-31 summarizes the results of this study. There were no significant differences in water quality observed between the harbors. In a report by Los Angeles Harbor Department (LAHD) (1997), they summarize inner harbor waters typically have degraded physical water quality than outer harbor waters due to reduced flushing (tidal exchange) and proximity to pollution sources (e.g., Dominguez Channel).

Table 2.3-31. Water Quality Results from Los Angeles and Long Beach Harbors and Consolidated Slip.

Water Quality Parameter	Results[1]		Notes
Temperature (°C)	Surface Mid-Depth Bottom	16.3 – 18.9 15.3 – 18.3 14.3 – 17.6	Slightly warmer in summer season than winter. Slightly warmer in inner harbor and other channels, basin and slips with restricted circulation than deeper, open areas of harbor.
Salinity (ppt)	Surface Mid-Depth Bottom	33.02 – 33.39 33.19 – 33.46 32.92 – 33.55	Slightly lower salinity values of surface waters in proximity to freshwater inputs during winter season
Dissolved Oxygen (mg/l)	Surface Mid-Depth Bottom	6.67 – 8.13 5.98 – 7.85 4.93 – 7.04	DO concentration slightly decreases with increasing depth. Spring and summer season DO concentrations were lower than those in winter and fall, potentially due to reduced vertical mixing.
pH	Surface Mid-Depth Bottom	7.86 – 8.09 7.88 – 8.03 7.81 – 7.99	Summer and fall seasons had higher pH values than winter and spring seasons, potentially due to differences in primary productivity.
Transmissivity (%)	Surface Mid-Depth Bottom	42.3 – 70.7 37.9 – 68.9 19.6 – 64.4	Water clarity decreased with increasing depth. No seasonal trends were apparent.

[1] Values reported are the range between each station's calculated annual mean.

Results from this survey effort suggested the water quality in the Los Angeles and Long Beach Harbors and Consolidated Slip was within normal ranges expected for estuarine and near-coastal waters throughout the survey period. This study provided information on local, seasonal and annual trends in the harbor. Additional information is needed to understand longer term trends associated with large-scale oceanographic and meteorological events (i.e. El Niño/La Niña cycles) (MEC 2002b).

These results also indicated an improvement from historical conditions. LARWQCB (1969) summarized efforts to characterize the water quality in Los Angeles Harbor during the 1950's and '60's. Seventeen stations were monitored on a monthly basis and samples collected and analyzed following the adoption of Los Angeles Regional Water Pollution Control Board (LARWPCB) Resolution No. 54-1 in 1954. These studies focused on dissolved oxygen (DO), dissolved sulfides, temperature, and other physical characteristics such as appearance and odor.

The historical water quality data suggest deficiencies in water quality compared to today's standards. LARWQCB (1969) indicates that the first annual report, prepared in 1954, to the LARWPCB concluded that dissolved oxygen was depressed or absent in the Consolidated Channel (DO measurements were recorded less than 0.5 ppm (mg/L)). Dissolved sulfides also exceeded standards near the entrance to Dominguez Channel. Further studies in the mid-1960's suggested DO concentrations decreasing and dissolved sulfides increasing significantly in the Consolidated Slip. Temperature was reported to be within expected levels for the local environment. The waters in areas of the harbor and channel were reported to be discolored (milky or white) and to have high concentrations of suspended material.

<u>Sources of Contaminants</u>

Discharges to the Dominguez Channel or Harbors may contain a variety of contaminants such as increased sediment loads, nutrients, metals, pathogens and organic chemicals. Physical and chemical processes will act on these contaminants to dissolve or disperse them. Additionally, processes of adsorption (contaminants binding to sediment or other particulate matter in the water column) and sedimentation (the settling of sediment or other particulate matter to the bottom) will reduce the concentration of these contaminants in the water column. However, these same processes may result in the accumulation of these contaminants in the sediments.

Accumulation of contaminants in localized areas may result in contaminant levels that exceed water and sediment quality guidelines and have an adverse effect to the local biological community. The CWA Section 303(d) requires that states identify and list water bodies that do not meet the water quality standards. Table 2.3-9 (see Section 2.3.1) was adapted from the 2002 California 303(d) list and identifies the water bodies within the Dominguez Watershed that exceed water quality standards (SWRCB 2002). These areas are discussed below.

In 1992, the LARWQCB began sediment monitoring in their region in accordance with the BPTCP. One of the objectives of this program was to distinguish areas within the harbor having concentrations of pollutants in the sediments exceeding guidelines. Another objective was to assess relationships between sediment toxicity and bioeffects. Based on the BPTCP, specific areas were identified as hot spots needing further investigations. The BPTCP compared sediment chemical concentrations to published guideline values denied from studies of approximately one thousand samples collected nationwide. Those studies used empirical observations of large data sets containing matching chemistry and biology data to provide guidance for evaluating the probability that measured contaminant concentrations may contribute to observed biological effects (SWRCB 1998).

The BPTCP identified two toxic hot spots within the watershed. The first is the Dominguez Channel/Consolidated Slip. Concentrations of DDT, PCBs, cadmium, copper, lead, mercury, zinc, dieldrin, chlordane and tributyltin (TBT) all exceeded sediment quality guidelines. A Phase I Ecological Risk Assessment of the Montrose Chemical Corporation facility (located in Los Angeles with discharges to the Dominguez Channel and Consolidated Slip) concluded that chemicals of concern are those that persist and are toxic in soils and sediments and bioaccumulate in organisms exposed to them. DDT and its metabolites were determined to be primary chemicals of ecological concern. (CH2M Hill 2001 as cited in AMEC 2002). The second is the Cabrillo Pier area. Sediment samples analyzed from this location have high concentrations of DDT, PCB and copper. Advisories have also been placed on consumption of fish and shellfish taken from this area due to the likely bioaccumulation of DDT and PCBs (LARWQCB 2001).

Seven additional areas (Inner Fish Harbor, Kaiser International, Hugo Neu-Proler, Southwest Slip, Cerritos Channel, Long Beach Outer Harbor and West Basin) have been identified as sites of concern by the BPTCP. These sites all have sediment concentrations of DDT and PCB and elevated concentrations of one or more of the following: chlordane, chromium, copper, endosulfan, lead, mercury, zinc, PAHs, TBT and sediment toxicity (LARWQCB 2001).

The BPTCP performed analyses of sediment samples and compared results to effect range median quotients (ERMQ). An ERMQ indicates the relative degree of pollution due to chemical mixtures. The results showed that the majority of stations with a high ERMQ value (i.e. high degree of pollution) were within the Consolidated Slip area and Berth 49 (former Kaiser International property). They determined that high concentrations of chlordane and total PCBs were causing the high ERMQ values in the Consolidated Slip (SWRCB 1998).

In addition to investigating concentrations of pollutants in the sediment, the BPTCP also performed toxicity tests. Most of the samples collected from Los Angeles and Long Beach Harbors were evaluated using whole sediment toxicity tests, while some organisms were exposed to pore water within the sediment. In a study that included samples from the Los Angeles and Long Beach Harbors and the Port of Hueneme, they found that pore water samples had higher toxicity than sediment samples to test organisms (CSWRCB 1998).

2.3.4.6 Machado Lake Subwatershed

The Machado Lake Subwatershed (Figure 2.3-21) is located in the southwestern area of the Dominguez Watershed and includes portions of the Cities of Los Angeles, Torrance, Lomita, Rolling Hills, Rolling Hills Estates, Carson, Palos Verdes Estates, Rancho Palos Verdes, Redondo Beach and the communities of unincorporated Los Angeles County including Wilmington and Harbor City. The Machado Lake Subwatershed covers an area approximately 5,180 square hectares (20 sq. miles) and is itself divided into six primary sub-drainage areas. These sub-drainages are the Walteria Lake, Project 77/510, Wilmington Drain, Project 643 (72" Storm Drain), Project 643 (Figueroa Drain), and Private Drain 553 areas.

Machado Lake (16 hectares, 40 acres) and the Machado Lake Wetlands (25 hectares, 64 acres) are located within the Ken Malloy Harbor Regional Park (KMHRP), in the southeastern corner of the Machado Lake Subwatershed. Both Machado Lake and the Machado Lake wetlands serve as flood retention basins for the Machado Lake Subwatershed.

Machado Lake receives urban and storm water runoff from a complex network of storm drain systems. The first of three primary storm drain channels that flow into Machado Lake is the Wilmington Drain. Approximately 65 percent of the runoff from the Machado Lake Watershed flows through the Wilmington Drain into Machado Lake. The other two primary storm drain channels are the Project No. 77 Drain and the Harbor City Relief Drain. Several smaller storm drains also discharge to Machado Lake including Project No. 643's Figueroa Street Outlet and a 72-inch Storm Drain Outlet. Machado Lake discharges at the southern end by overflowing a concrete dam into the Machado Lake wetland. Water discharges from the wetland through the Harbor Outflow structure and into the West Basin of the Los Angeles Harbor (Parsons 2002).

Water Quality

Historical studies of water and sediment quality were conducted in the mid to late 1970's and early 1990's. During the period 1974 – 1977, four stations in Machado Lake and four stations in Wilmington Drain were monitored bi-weekly for basic water quality parameters and quarterly for water chemistry. Sediment samples for chemical analyses were also collected on a yearly basis at the Machado Lake stations. This study found that water quality variability between stations during each sampling event was minimal for nitrate, phosphate, total dissolved solids, biochemical oxygen demand, chemical oxygen demand, DO and temperature. However, water quality variability at stations during the course of a year was significant for all parameters except temperature. Thus, water quality objectives for inland surface waters as applied to Machado Lake were met during this period with two exceptions related to natural conditions (DO occasionally dropped below 5 mg/L and TDS was above 500 mg/l (730 mg/L) once). The corresponding sediment sampling found chromium, cadmium, copper, nickel and zinc had consistently lower sediment concentrations at one station on the west side of the lake. This may have been related to anthropogenic (recreational paddleboat) agitation of sediments in shallow water. Consistent increases in sediment concentrations of mercury, lead, oil and grease, and total organic matter were observed during the study period (Parsons 2002).

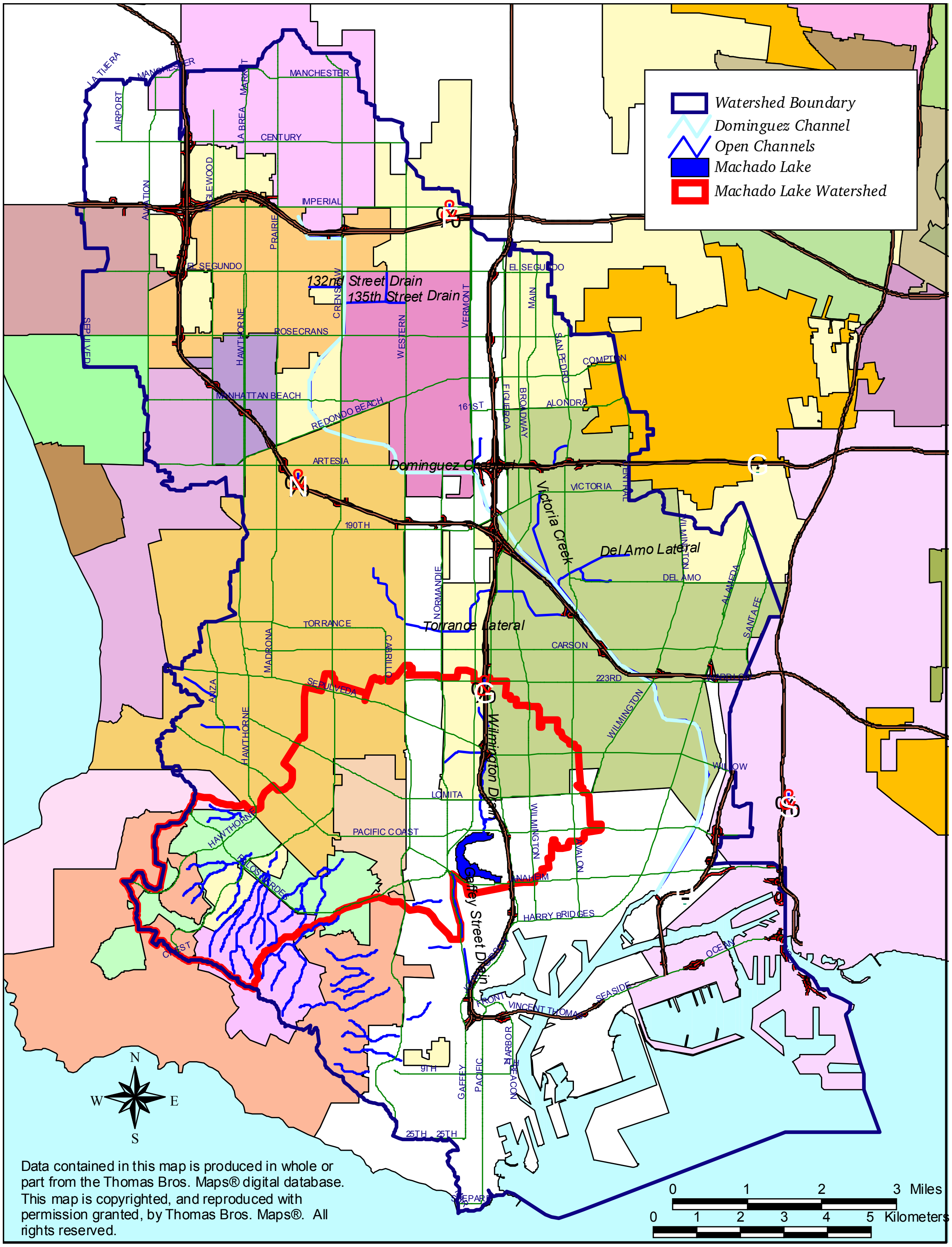


Figure 2.3-21. Machado Lake Subwatershed.

The California Department of Fish and Game conducted fish sampling annually in Machado Lake between 1983 and 1997 as part of the California Toxic Substances Monitoring Program. Data from this program are available on the SWRCB web site.

Monthly water quality monitoring during the period 1992–1993 by University of California, Riverside for the LARWQCB concluded that the water quality of Machado Lake was highly impaired based on nutrients, organics, productivity and aesthetics. This study also determined that storm water runoff was the primary cause of the higher concentrations of minerals and nutrients observed in Machado Lake. They indicate that fertilizers used in residential areas, parks and golf courses were the most likely source of the elevated nutrient levels (Parsons 2002). The increased levels of phosphorus from fertilizer runoff has also stimulated algal growth, which in turn decreases the available dissolved oxygen (City of Lomita 1998).

As a result of deteriorating water quality and increased sediment toxicity, the LARWQCB identified Machado Lake as an impaired body of water. The CWA Section 303(d) list of impaired water bodies indicates the pollutants/stressors of concern for Machado Lake are DDT, PCBs, chlordane, algae, ammonia, ChemA pesticides, dieldrin, eutrophication, odors and trash (Table 2.3-3). These pollutants are similar to those of urban runoff. As part of creating a long-term plan for restoring the Machado Lake and Subwatershed to acceptable levels, Parsons Engineering Science, Inc. (Parsons) performed water and sediment sampling in 2001 for a Habitat Restoration and Lake Water Quality Improvement Design and Development Report sponsored by the Los Angeles Department of Recreation and Parks and the Palos Verdes/South Bay Audubon Society.

Parsons performed two dry weather and one wet season sampling events at seven stations. Four stations were located at storm water discharges into the lake, one station was located at the Harbor Outflow structure, and two stations on the lake. They concluded that the influent to the lake at the storm drain discharge stations had elevated levels of metals, fecal coliform and trash. Machado Lake was determined to be impaired for high concentrations of metals and aesthetics. Tables 2.3-32 and 2.3-33 summarize the results of the water quality monitoring.

The Wilmington Drain discharges into the northern portion of Machado Lake. Storm water runoff through the Wilmington Drain is the primary conveyance of trash to the lake. Trash is a primary reason for the impairment of beneficial uses to the lake and may be a contributing factor to the elevated levels of coliform bacteria at the discharge points into the lake.

Sediment Quality

Sediment samples were also collected by Parsons in spring 2001. Fifteen sites were located within the lake, one site was located downstream of the Wilmington Drain discharge point, and two stations were located in the Machado Wetland. The bottom sediments consist primarily of a surface layer of unconsolidated, black, organic-rich mud overlying a layer of greenish-grey clay. In the area of the Project No. 77 Drain, however, the bottom sediments are poorly sorted fine to medium sands (Parsons 2002).

The highest concentrations of total organic carbon (TOC) in the sediments (max = 10,400 mg/kg) were observed in the northern part of lake. Similarly, sediment samples in the northern portion of the lake also had higher concentrations of diesel and oil (max = 140 mg/kg and 320 mg/kg, respectively).

Table 2.3-32. Comparison of Machado Lake water quality results to Basin Plan Water Quality Standards.

Constituent	Basin Plan Designated Water Quality Standard*	Machado Lake Water Quality**
Ammonia	Standard varies depending on pH and temperature. For pH between 7 and 8 at the temperature between 15 and 20° C, the four-day average concentration of ammonia is from 0.79 to 1.74 mg/L for waters designated as WARM.	The composited samples (collected every hour for 3 hours) showed the levels of ammonia in the lake water ranging from <0.2 to 0.3 mg/L.
Coliform Bacteria	In waters designated for REC-1, the fecal coliform concentration shall not exceed a log mean of 200 MPN/100 mL (based on a minimum of not less than four samples for any 30-day period), nor shall more than 10 % of total samples during any 30-day period exceed 400 MPN/100 mL. In waters designated for REC-2 and not designated for REC-1, the fecal coliform concentration shall not exceed a log mean of 2000 MPN/100 mL (based on a minimum of not less than four samples for any 30-day period), nor shall more than 10 % of total samples during any 30-day period exceed 4000 MPN/100 mL.	There are not enough data to compare with the standard. However, based on the three sampling events, the fecal coliform concentrations exhibited a value higher than the standard set forth for REC-1, but within the standard for REC-2 during the two dry weather sampling events.
Biochemical Oxygen Demand	Waters shall be free of substances that result in increases in BOD_5 which adversely affect beneficial uses.	BOD_5 concentrations in the lake were found in the range of <0.2 to 1 mg/L during the wet season and increased to the range of 4.2 to 8.9 mg/L during the dry season.
Biostimulatory Substances	Waters shall not contain biostimulatory substances (nitrogen, phosphorus) that promote aquatic growth to the extent that such growth causes nuisance or adversely affects beneficial uses.	No clear evidence of algal bloom in the lake during all sampling events.
Dissolved Oxygen	The DO content of all surface waters designated as WARM shall not be depressed below 5mg/L as a result of waste discharges.	DO levels in Machado Lake ranged from 5.9 to 6.9 mg/L.
Nutrients	No specific ranges of nitrogen and phosphorus were set forth in the Basin Plan. However, for nutrients, the Basin Plan objective for nitrates-N plus nitrites-N is not greater than 10 mg/L.	Total phosphorus concentrations in the lake water increased from the range of 0.43-0.46 mg/L during wet weather sampling, to the range of 1.0-1.4 mg/L during dry weather sampling. The nitrate plus nitrite concentrations were below 1 mg/L in the samples collected during wet and dry weather sampling events with a slight reduction during the dry weather sampling event.
Color	Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.	Machado Lake water always exhibits a brownish color. The color becomes darker in the dry weather season.
Floating Materials	Waters shall not contain floating materials, including solids, liquids, and scum, in concentrations that cause nuisance or adversely affect beneficial use.	Trash is present at various storm water discharging locations to the lake, especially during storm events.
Pesticides	Water designates for use as MUN shall not contain concentrations of pesticides in excess of the limiting concentrations specified in Table 64444-A of Section 64444 (organic chemicals) of Title 22 of the California Code of Regulations.	Pesticide concentrations during the three sampling events did not exceed the designated standards.
PCB	The purposeful discharge of PCBs to waters of the region, or at locations where the waste can subsequently reach waters of the region, is prohibited. Pass-through or uncontrollable discharges to waters of the region, or at locations where the waste can subsequently reach waters of the region, are limited to 70 pg /L (30 day average) for protection of human health and 14 ng/L and 30 ng/L (daily average) to protect aquatic life in inland fresh waters and estuarine waters respectively.	Organopesticides and PCBs were all detected below the PQLs.

* Basin Plan, 1994
** Machado Lake Water Quality Monitoring Program, 2001

Source: Parsons 2002 (Table 4-5)

Table 2.3-33. Comparison of Machado Lake water quality to USEPA recommended water quality criteria.

Priority Pollutants	Recommended Criteria for Freshwater		Concentrations of Pollutants found in Machado Lake	
	CMC[a](μg/L)	CCC[b](μg/L)	Wet Season	Dry Season
Arsenic	340	150	3.4-3.7	<5
Cadmium	4.3	2.2	0.6	<2
Chromium III	570	74	13.0-13.6 as total chromium	5.8-8.8 as total chromium
Chromium VI	16	11	<0.01	<0.01
Copper	13	9	11.1-12.4	<10
Lead	65	2.5	6.1-6.8	<5-17.1
Mercury	1.4	0.77	<0.5	0.22-0.99
Nickel	450	52	11.7-16.4	4.9-9.3
Selenium	-	5.0	<10	<10
Silver	3.4	1.9	<10	<10
Zinc	120	120	67.9-68.8	29.6-44.7
Aldrin	3.0	-	<0.05	<0.05
Gamma-BHC	0.95	-	<0.05	<0.05
Chlordane	2.4	-	<0.05	<0.8-<2
4,4'DDT	1.1	0.001	<0.1	<0.81-<1
Dieldrin	0.24	0.056	<0.1	<0.1-<0.44
Endrin	0.086	0.036	<0.1	<0.39-<0.1
Heptachlor	0.52	0.0038	<0.05	<0.05-<0.32
Heptachlor Epoxide	0.52	0.0038	<0.05	<0.05-<0.32
Toxaphene	0.73	0.0002	<5	<0.5

Notes:
[a] Criteria Maximum Concentration (CMC) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed briefly without resulting in an acceptable effect.
[b] Criterion Continuous Concentration (CCC) is an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect.
- No recommended criteria

Sources: USEPA 1999, Parsons 2002

Six VOCs (acetone, carbon disulfide, chloroform, methylene chloride, naphthalene and p-isopropylbenzene) and seven SVOCs (benzo(b)fluoranthene, benzo(k)fluoranthene, bis(2-ethylhexyl) phthalate, benzyl butyl phthalate, chrysene, fluoranthene, and pyrene) were detected in all sediment samples, but detections were estimated values above the Method Detection Limit (MDL). One or more organochlorine pesticide compounds (delta BHC, alpha-chlordane, gamma-chlordane, DDE, DDT, and dieldrin) were detected in all sediment samples analyzed. DDE in the northern portion of the lake exceeded Region 5 U.S. EPA Ecological Data Quality Level (EDQL) but did not exceed the No Observed Adverse Effect Level (NOAEL). One polychlorinated biphenyl (Arochlor 1260) was detected in a sediment sample in the northern portion of the lake (Parsons 2002).

Metals were detected in all sediment samples analyzed. Arsenic, cadmium, chromium, copper, lead, nickel, and zinc exceeded the Region 5 USEPA EDQL. Barium, chromium, lead, vanadium and zinc exceeded the NOAEL. Hexavalent Chromium and TBT were not detected.

2.3.4.7 Future Monitoring and Structural Controls

The LARWQCB (2001b) has proposed the following long-term activities for the Dominguez Watershed:

- Development of a watershed-wide monitoring program.
- Consideration and implementation of TMDL-related issues.
- Further evaluate beneficial uses throughout the watershed.
- Restoration of habitat following improvement of water quality.
- Implementation of biological monitoring.
- Development of sediment quality objectives.
- Explore options for, and implement, sediment cleanup/removal.

The following are existing or proposed projects to reduce and/or minimize pollutants of storm water and urban runoff (LACDPW 2001b):

- LACDPW has proposed to install: catch basin inserts in all maintenance yards, catch basin debris excluders in selected catch basins and in-line storm water clean-up devices in selected storm drains. They are also proposing the construction of permanent roof covers for existing and new material storage areas and fuel dispensing islands in some of their facilities.
- The Port of Los Angeles has installed a catch basin inlet with filter on Palos Verdes Street in San Pedro in June of 1998.
- The City of Los Angeles Bureau of Sanitation has built a Vortechnics, Inc. system at the Harbor Refuse Yard to capture and treat storm water runoff.
- The City of Torrance has proposed the following projects:
  (1) Madrona Marsh:
    - Install catch basin excluders in selected catch basins.
    - Construct a strip berm at the northwest corner of the preserve to prevent trash from entering the preserve.
    - Reconstruct a portion of Madrona Avenue in order to increase the level and quantity of water retained.

  (2) Projects to improve and enhance the water quality of effluent discharges for the El Dorado Basin, Mobil Oil Basin, Pioneer Basin, Amie Basin, Doris Basin, Entradero Basin and Henrietta Basin.

2.3.4.8 Program Questionnaires

A water resources questionnaire was issued to stakeholders of the Dominguez Watershed to gather information about management procedures, watershed problems, unmet needs, and enhancement and restoration opportunities.

The first part of the questionnaire was in regard to storm water sampling and dry weather flow (Table 2.3-34). Four of the jurisdictions that responded sample storm water runoff during storm events and have the data available for at least the past one to two years. Sampling ranges from testing for organics only, to a more comprehensive sampling of bacteria parameters, metals, and organics. Two of the four jurisdictions have the storm event data available electronically in spreadsheet and/or database formats.

Table 2.3-34. Response to questionnaire on water quality monitoring in the Dominguez Watershed.

Organization	Sample Storm Water Runoff	Sample Dry Weather Flow	Storm Water Hotline	Sewage Pipelines Under Waterbodies	Area and BMPs within ESAs	Homeless Encamp-ment Problems
Carson	No	No	No	Yes	No ESAs	No
Gardena	Yes (field observations, bacteria, metals, organics - hard copy reports, 1-2 yrs data)	No	Yes	No	Protect ESAs with 6 ft chain link fence, additional BMPs required for developments within ESAs	No
Hawthorne	No	No	Yes	NA	No ESAs	NA
Inglewood	Yes (organics - hard copy reports, 1-2 yrs data)	No	Yes	No	Additional BMPs required for developments within ESAs	No
Long Beach	No	No	Yes	No	No ESAs within watershed	NA
Los Angeles	No	No	No	No	NA	Yes
Manhattan Beach	No	No	Yes	No	No ESAs within watershed	No
Torrance	No	No	Yes	Yes	Tributary drainage area; additional BMPs required for developments within ESAs	No
Los Angeles County	Yes (field observations, bacteria, metals, organics - hard copy reports, Excel spreadsheets, 3-5 yrs data)	Yes (metals, organics - Excel spreadsheet, 1-2 yrs data)	Yes	Yes, none slip-lined	None beyond those required to comply with SUSMP	Yes
Port of Long Beach	Yes (field observations, metals, organics - hard copy reports, Excel spreadsheets, electronic data base, > 5 yrs data)	Yes (field observations, bacteria, metals, organics - hard copy reports, electronic data base, > 5 yrs data)	No	No	No ESAs	No

Notes:
ESA = Environmentally Sensitive Area
NA = Not answered
SUSMP = Standard Urban Storm Water Mitigation Plan

Two of the jurisdictions indicated they sample dry weather flow for all of the previously mentioned data types in electronic formats.

Seven of the jurisdictions that responded maintain a storm water hotline for complaints. The majority of complaints received (upwards of ten complaints per year) pertain to flooding, illegal dumping, sewage line spills/breaks, trash and debris. There were also several (averaging five to ten complaints per year) comments regarding pollution, concrete wash out, and toxic spills.

The next set of questions covered information regarding sewage pipelines that run under the Dominguez Channel, Machado Lake, and its tributaries. Three of the jurisdictions that responded have pipelines in this area. One jurisdiction stated that sewer lines are inspected twice per year with siphons being cleaned every 30 to 60 days. Another jurisdiction did not know the frequency, but did state the last inspection was in 2002. None of the jurisdictions have sewage pipelines that have been slip lined.

The questionnaire also included questions concerning Environmentally Sensitive Areas (ESAs). Two jurisdictions stated they do define the drainage associated with delineated ESAs. One uses a six-foot chain link fence and the other uses a tributary drainage area. Three of the jurisdictions do require additional BMPs for industries, commercial facilities, municipal facilities, and residential areas within the ESAs.

The questionnaire asked if homeless encampments were located in the area. Two jurisdictions had affirmative answers. The area along the length of the Dominguez Channel below Vermont was identified as an area used by homeless individuals. In particular, homeless encampments occur under street overpasses and along Wilmington Drain. Areas where homeless encampments are known to occur within the Dominguez Watershed are inspected weekly, and other areas within the watershed are inspected as needed. Both jurisdictions agreed that more frequent inspections and code enforcement are needed. Several problems are associated with homeless encampments including interference with flood control maintenance; accumulation of debris, trash, and human waste that can contribute to degradation of water and habitat quality; curtailment of public use if adjacent to recreational areas, and public health and safety concerns. In a 1999 study conducted by the City of Los Angeles, the homeless population was found to be diffuse, mobile, and living in small groups (www.ci.la.ca.us/lacounts/homeresu.htm). In addition, the study found that the majority of the homeless individuals remain on the street rather than stay in temporary or permanent shelters, but about 59 percent of them used either food or shelter services on occasion. Although, the City of Los Angeles study did not cover the Dominguez Watershed, the results are relevant in pointing out the chronic nature of the homeless issue.

The questionnaire sought more information about BMPs. Several of the jurisdictions use structural BMPs to improve water quality (Table 2.3-35). Four jurisdictions use a type of inlet device or oil grit separator. Three jurisdictions use a continuous deflection separator (CDS). Three jurisdictions use detention basins and two jurisdictions use clarifiers. Three jurisdictions provided information about BMP and maintenance costs. Three jurisdictions monitor for effectiveness of the BMP.

Table 2.3-35. Response to questionnaire on BMP use in the Dominguez Watershed.

Organization	Structural BMPs	Comments	BMP Type						
			Clarifiers	Detention Basins/ Ponds	Sand Filters	Inlet Device/ Oil Grit Separators	Storm Water Wetlands	Continuos Deflection Separators	Other
Carson	Yes			Yes		Yes		Yes	
Gardena	Yes		Yes	Yes	Yes	Yes	Yes		Street Sweeping
Hawthorne	Yes	No Further Information Given							
Inglewood	Yes					Yes		Yes	
Long Beach	No	BMPs not within Dominguez Watershed							
Los Angeles	No	Not responsible for BMPs							
Manhattan Beach	Yes	BMPs not within Dominguez Watershed							
Torrance	Yes			Yes				Yes	
Los Angeles County	Yes					Yes			Trash Boom
Port of Long Beach	Yes		Yes						

The next set of questions asked about guidance documents and public outreach. Most of the jurisdictions have at least one of the following storm water documents prepared (Table 2.3-36):

- Storm Water Quality Management Plan.
- Watershed Urban Runoff Management Plan.
- BMP guidance for industries.
- BMP guidance for commercial facilities.
- BMP guidance for residential developments.
- BMP guidance for construction.

Seven of the jurisdictions provide assistance or guidance documentation to businesses regarding development of pollution prevention or environmental management system plans, other jurisdictions responded that this type of assistance could be helpful.

The jurisdictions were also asked to highlight the type of public outreach and educational activities that are currently implementing for storm water and water quality issues. Eleven jurisdictions answered and the following is a list of activities beginning with the most frequent response:

- Employee training relative to federal, state, and municipal storm water permit requirements, issues and BMPs.
- Distribution of brochures or leaflets explaining storm water requirements and BMPs.
- Recycling campaigns.
- Presentations to community groups.
- Cleanup events within the watershed.
- Litter campaigns.
- Presentations to trade associations or business groups.
- School presentations.
- Reminder letters to businesses regarding obligations for compliance with federal, state, and local storm water permit requirements.
- Radio announcements.

2.3.5 Summary of Water Resources

The Dominguez Watershed is located in southwestern Los Angeles County and for purposes of this report has been divided into the following five subwatersheds: Upper Channel, Lower Channel, Harbors, Machado Lake, and Retention Basins. The Dominguez Watershed is highly urban and its drainage network is primarily conducted through an extensive network of underground storm drains. Runoff throughout the watershed occurs during rain events and also from dry-season flows.

Regulatory requirements concerning water quality have evolved from the creation of the Clean Water Act in 1972. From this the EPA developed the NPDES program to improve water quality conditions in the United States. Along with the NPDES program, water quality standards within the State of California are regulated by the SWRCB. The SWRCB has developed a Basin Plan for the Los Angeles area that outlines water quality objectives and specifies beneficial uses for each of its water bodies. The SWRCB had also developed a list of impaired water bodies that outlines specific water bodies and their respective water quality impairment(s).

Table 2.3-36. Response to questionnaire regarding prepared storm water management documents.

Organization	Storm Water Quality Management Plan	Watershed Urban Runoff Management Plan	BMP Guidance for Industries	BMP Guidance for Commercial Facilities	BMP Guidance for Municipal Facilitates	BMP Guidance for Residential Developments	BMP Guidance for Construction
Gardena	Prepared		Prepared	Prepared	Prepared	Prepared	Prepared
Hawthorne	Prepared		Prepared	Prepared	Prepared	Prepared	Prepared
Inglewood	Prepared	Prepared	Prepared	Prepared	Prepared	Prepared	Prepared
Long Beach	Prepared		Prepared	Prepared	Prepared	Prepared	Prepared
Manhattan Beach	In Preparation	In Preparation	NA	Prepared	Prepared	Prepared	Prepared
Torrance	Planned	Planned	Prepared	Prepared	Prepared	Prepared	Prepared
Los Angeles County	Prepared		Prepared	Prepared	Prepared	Prepared	Prepared
Port of Long Beach	Prepared	NA	Prepared	NA	NA	NA	Prepared

NA = not answered.

Groundwater is an important resource and is part of the continuous hydrologic cycle. The groundwater basin underlying the majority of the Dominguez Watershed is the West Coast Basin, which is composed of four major aquifers. Inflow of water to this groundwater system occurs both naturally and artificially. Natural inflow includes replenishment of groundwater by infiltration of regional precipitation and groundwater underflow from adjacent basins. Artificial inflow is the replacement of water at spreading grounds or seawater barrier wells. Imported water is used to replenish groundwater stores. Seawater intrusion is a concern within the West Coast Basin and can result in groundwater supplies becoming unusable for drinking water. Imported and recycled water have been used to control seawater intrusion. Industrial activities have also contaminated the groundwater resources within the watershed. Groundwater within the watershed has been affected by releases of petroleum hydrocarbons, chlorinated solvents, SVOCs, VOCs, PAHs, organics, and metals.

Water quality problems within the Dominguez Watershed were noted as early as 1926 when harbor tenants complained of ship hulls being darkened. Monitoring programs have been conducted in the Dominguez Channel since the 1940's by various agencies with different monitoring objectives.

The majority of these monitoring programs have developed from the creation of the NPDES program in 1972. The current NPDES municipal permit is a comprehensive program requiring municipalities to conduct water quality sampling. LACDPW has been conducting storm water sampling under the NPDES permit since 1994. Major discharges such as oil refineries also have their own NPDES permits and are required to conduct water quality sampling on a regular basis to ensure their effluent meets regulatory requirements. In 2002 the LARWQCB conducted a bacteriological survey of the Dominguez Channel in support of its TMDL program.

Water quality impairments in the Dominguez Channel and its tributary storm drains come from a variety of sources including municipal and industrial discharges and nonpoint source runoff. Constituents and/or impairments of concern for the Dominguez Channel include ammonia, high coliform counts, benthic community effects, ChemA pesticides, aldrin, dieldrin, chlordane, chromium, copper, lead, selenium, zinc, DDT, PAHs, and PCBs.

Various studies have been conducted in the harbor areas of the watershed. Discharges to the Dominguez Channel and the harbors may contain a variety of contaminants such as increased sediment loads, nutrients, metals, pathogens, and organic chemicals. Both water and sediment contamination has been documented. Many of these contaminants ultimately settle into the marine sediments. Consolidated Slip and the Cabrillo Pier area have been identified as toxic hot spots within Los Angeles Harbor. Concentrations of DDT, PCBs, cadmium, copper, lead, mercury, zinc, dieldrin, chlordane and TBT detected in the Consolidated Slip all exceed sediment quality guidelines. Sediment samples collected from the Cabrillo Pier area have high concentrations of DDT, PCBs, and copper.

Water quality monitoring had also been conducted within the Machado Lake Subwatershed. As a result of deteriorating water quality and increased sediment toxicity, the LARWQCB has identified Machado Lake as an impaired water body. Constituents of concern for this water body include DDT, PCBs, chlordane, algae, ammonia, ChemA pesticides, dieldrin, eutrophication, odors, and trash.

In addition to water quality monitoring, water quality modeling is also conducted for the Dominguez Watershed. LACDPW has developed a GIS pollutant Loading Model. The model uses existing drainage basins, land use, rainfall data, water quality results, and available geographic data to calculate the amount of runoff and pollutant loading from the Dominguez Watershed and its subwatersheds. Other organizations in addition to LACDPW are also conducting water quality modeling. SCCWRP along with LLNL are developing a dynamic wet weather runoff model for the Dominguez Watershed.

Special studies have been conducted within the Dominguez Watershed to address specific areas of concern. Studies have been conducted in the watershed to gather data on bacterial contamination, sediment contamination, and benthic ecology. Additionally, studies have been conducted related to two Superfund sites. The Del Amo Superfund Site covers an area of a former rubber manufacturing facility. Contaminants of concern for this Superfund site include VOCs, PAHs, and SVOCs. The Montrose Superfund Site covers an area where the Montrose Chemical Corporation once manufactured DDT. The contaminants of concern for this Superfund site are DDT, chlorobenzene, and BHC.

Municipalities throughout the watershed monitor storm water runoff, and have existing or proposed water quality improvement projects that include a variety of BMP devices or procedural modifications. Most jurisdictions maintain a storm water hotline for complaints. Public outreach and educational activities are also part of the stakeholders management programs.

The LARWQCB has proposed long-term activities for the Dominguez Watershed which include enhancing monitoring programs, developing TMDLs, evaluation of beneficial uses, habitat restoration, and developing sediment quality objectives and options for sediment cleanup and removal.

2.4 Biological Resources

Existing conditions of habitats and biological resources within the Dominguez Watershed were summarized based on review of available reports, search of the California Natural Diversity Database (CNDDB), and reconnaissance-level surveys.

Two recent projects have been conducted within the watershed that provide comprehensive reviews of biological resources at the Ken Malloy Harbor Regional Park (Parsons 2002) and within the Los Angeles-Long Beach Harbor complex (MEC 2002b). Reports from those projects were used to provide an overview summary of resources within those areas of the watershed.

Wetland and canyon open space areas within the watershed were visited in September 2002, December 19, 2002 and/or February 28, 2003 by Biology Task Leader (Karen Green), project biologists (Dr. Noel Davis, Pam DeVries, Chris Blandsford), and Mary Loquvam of the Southern California Wetlands Recovery Project (SCWRP), who coordinated access to areas where needed. The December and February reconnaissance survey days occurred after storm events with substantial rainfall, and open water was present at all wetland habitats. The survey team spent a variable amount of time at each location depending upon its size (e.g., 30 minutes to 2 hours), and recorded plants and wildlife observed on site as well as notes on habitat quality. The habitat evaluation considered the occurrence of exotic invasive plants, presence of absence of vegetation within channels and on channel banks, evidence of erosion or sedimentation, eutrophication, trash/debris, and extent of buffer between the natural areas and urban development.

This biological resources section is organized into three subsections. Environmental laws and regulations promulgated for or with provisions to protect biological resources are summarized in Subsection 2.4.1. These laws and regulations would need to be considered and/or complied with prior to implementation of management actions with the potential to disturb existing habitat (e.g., projects involving enhancement or restoration). Subsection 2.4.2 discusses the habitats within the Dominguez Watershed. Sensitive species within the watershed are described in Subsection 2.4.3. Appendix B provides lists of wildlife (Appendix B.1) and plants (Appendix B.2) that were observed during the reconnaissance visits and/or have been reported for representative areas within the watershed.

2.4.1 Regulatory Requirements

2.4.1.1 Federal

Clean Water Act of 1972

The CWA was established to restore and maintain the chemical, physical, and biological integrity of the nation's waters. Specific sections of the CWA control the discharge of pollutants and wastes into freshwater and marine environments.

Sections 401 and 404 were described in Section 2.2.1. Sections 303(d), 401, 402, and 403, which pertain to water quality standards were described in Section 2.3.1.

Fish and Wildlife Coordination Act of 1958

The Fish and Wildlife Coordination Act requires that whenever a body of water is proposed to be controlled or modified, the lead agency must consult the state and federal agencies responsible for fish and wildlife management (U.S. Fish and Wildlife Service [USFWS], CDFG, and National Marine Fisheries Service [NMFS]). This act allows for recommendations addressing adverse impacts associated with the proposed project, and for mitigating or compensating for impacts of fish and wildlife.

Marine Mammal Protection Act

The Marine Mammal Protection Act prohibits the taking (including harassment, disturbance, capture, and death) of any marine mammals except as set forth in the act. For actions that may be taken under the Dominguez WMMP, the Marine Mammal Protection Act would only apply to activities within Los Angeles and Long Beach Harbors or ocean waters.

Endangered Species Act of 1973

The Endangered Species Act (ESA) protects threatened and endangered species by prohibiting actions that would jeopardize the continued existence of such species or adversely affect the critical habitat of these species. The act requires agencies proposing an action that may affect listed species to consult the USFWS and NMFS, which will evaluate the potential impacts of all aspects of the project on any threatened or endangered species, and provide alternatives or measures to minimize effects caused by the proposed project.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act protects certain migratory birds including all seabirds by limiting hunting, capturing, selling, purchasing, transporting, importing, exporting, killing, or possession of the birds, or their nests or eggs.

Magnuson-Stevens Fishery Management and Conservation Act, as Amended (16 U.S.C. 1801 et Seq)

The 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act set forth a number of new mandates for the National Marine Fisheries Service (NMFS), regional fishery management councils, and other federal agencies to identify and protect important marine and anadromous fish habitat. The Councils, with assistance from NMFS, are required to delineate "essential fish habitat" (EFH) for all managed species. The Act defines EFH as "… those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." Federal action agencies which fund, permit, or carry out activities that may adversely impact EFH are required to consult with NMFS regarding the potential effects of their actions on EFH, and respond in writing to the fishery service's recommendations. For the Pacific region, EFH has been identified for a total of 89 species covered by three fishery management plans (FMPs) under the auspices of the Pacific Fishery Management Council. The waters of the Ports of Los Angeles and Long Beach are EFH.

2.4.1.2 State

California Endangered Species Act of 1984

This act provides for the recognition and protection of rare, threatened, and endangered species of plants and animals.

California Fish and Game Code

Streambed Alteration Agreement

Fish and Game Code section 1601 et seq. regulates activities that may divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake designated by the Department in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit. For any work within or on the banks of a lake or stream a Streambed Alteration Agreement must be obtained from the California Department of Fish and Game.

Nest or Eggs

Fish and Game Code section 3503 protects California's birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs or any bird.

Birds of Prey or Eggs

Fish and Game Code section 3503.5 protects California's birds of prey and their eggs by making it unlawful to take, possess, or destroy any birds of prey or to take, possess, or destroy the nest or eggs of any such bird.

Migratory Birds

Fish and Game Code section 3513 protects California's migratory birds by making it unlawful to take or possess any migratory non-game bird as designated in the Migratory Bird Treaty Act or any part of such migratory non-game bird.

Fully Protected Species

Fish and Game Code sections 3511, 4700, 5050, and 5515 prohibits take of animals that are classified as Fully Protected in California.

Significant Natural Areas

Fish and Game Code section 1930 et seq. designates certain areas such as refuges, natural sloughs, riparian areas and vernal pools as significant wildlife habitat.

Native Plant Protection Act of 1977

Fish and Game Code section 1900 et seq. designates state rare, threatened, and endangered plants.

2.4.2 Habitats

2.4.2.1 Overview

There are several types of habitats within the Dominguez Watershed. The largest habitat is urban, developed land. Vacant land includes several types of habitats ranging from open water to woodlands. The exact acreage associated with each of the habitat types within the watershed is unavailable since many of the open space areas have not been comprehensively surveyed.

The various habitat types are briefly described based on their characteristic features. Open water habitats are areas that are permanently covered with water. Non-vegetated floodway channel refers to drainage channels that are unvegetated either because high flows prevent vegetation from persisting or because vegetation is removed to preserve their capacity to contain storm flows. Beach is the unvegetated area within and just above the intertidal zone within the harbors. Southern coastal salt marsh communities are found in areas that are regularly flooded or saturated and contain clay and silt soils with a high salt content. They occur along the coast in estuarine habitats influenced by tidal forces. Vegetation consists of halophytic perennial herbs and low shrubs. Typical species include California cord grass (*Spartina foliosa*), pickleweed (*Salicornia virginica*), salt grass (*Distichlis spicata*), shore grass (*Monanthochloe* sp.), jaumea (*Jaumea carnosa*), saltwort (*Batis maritime*), alkali heath (*Frankenia salina*) and sea-lavender (*Limonium californicum*).

Habitats within the Dominguez Watershed
(classification after Holland 1986, Oberbauer 1996)

- Open water
  - Marine/bay open water
  - Freshwater
- Non-vegetated floodway channel
- Beach
- Coastal salt marsh
- Coastal and valley freshwater marsh
- Vernal pool
- Riparian scrub
  - Southern willow scrub
  - mule fat scrub
- Riparian woodlands
- Coastal sage scrub
- Valley and foothill grassland
  - Native grassland
  - Non-native grassland
- Urban/developed

Coastal freshwater marsh communities occur where low-lying areas are seasonally or permanently flooded with freshwater. Freshwater marsh communities typically are dominated by cattails (*Typha* spp.) and sedges (*Scirpus* spp.). Vernal pool communities occur in low depressions that usually are flooded and saturated above a layer of clay or hardpan for several weeks to a few months in the winter and spring. Riparian habitats occur along watercourses or water bodies and have soil that is flooded or saturated during at least a portion of the growing season. Vegetation consists of herbs, shrubs and trees adapted to these wet conditions. Southern willow scrub is dominated by bushy stands of willow species such as arroyo willow (*Salix lasiolepis*) and narrow-leaved willow (*S. exigua*) and smaller amounts of mule fat (*Baccharis salicifolia*) and black willow (*S. gooddingii*). Mulefat scrub is dominated by mulefat. Riparian woodlands are dominated by mature willow trees and sometimes cottonwoods (*Populus* spp.) and western sycamore (*Platanus racemosa*).

The coastal sage scrub community consists of low-growing, drought-deciduous and evergreen shrubs that occur on steep to moderate slopes below 3,000 feet in elevation. Dominant species include California sagebrush (*Artemesia californica*) California buckwheat (*Eriogonum fasciculatum*), coast goldenbush (*Isocoma menziesii* var. *vernoniodes*), deerweed (*Lotus scoparius*), laurel sumac (*Malosma laurina*), lemonade berry (*Rhus integrifolia*), and white sage (*Salvia apiana*). Grassland habitats are identified by areas of low-growing herbaceous vegetation dominated by grasses. The relative cover of annual and perennial grass species distinguishes subtypes of grasslands. Urban/developed areas are covered with structures (e.g., buildings, roads).

Open space areas supporting sensitive habitats are shown on Figure 2.4-1. The largest "natural" habitat within the watershed is the Los Angeles-Long Beach Harbor complex within San Pedro Bay. The most abundant terrestrial native habitats occur in the canyons of the Palos Verdes Peninsula. Native plant communities found in these canyons include coastal sage scrub and riparian habitats such as willow woodlands. Isolated patches of coastal sage scrub also occur east of the canyon areas.

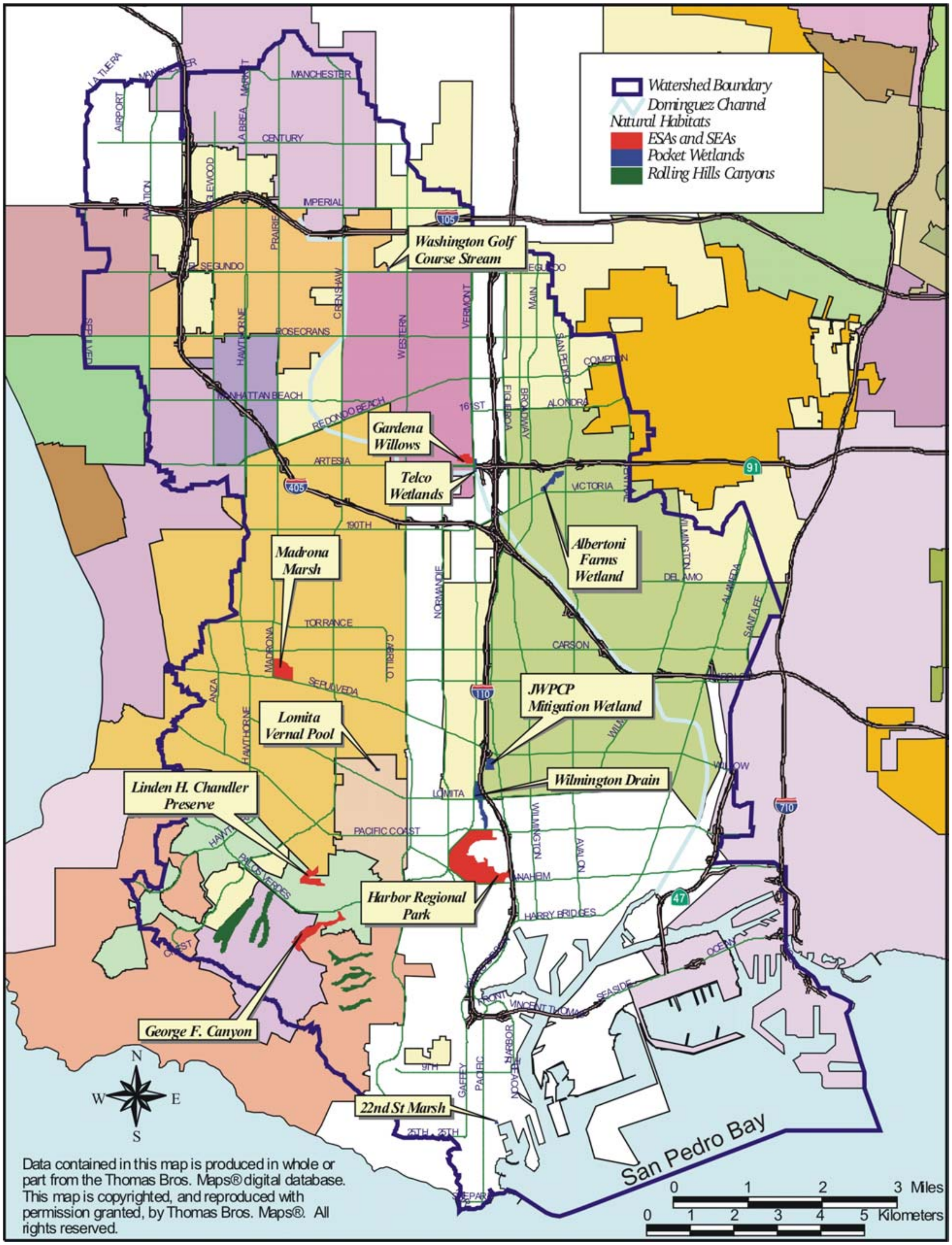


Figure 2.4-1. Sensitive habitats within the Dominguez Watershed.

Several flood control and tributary channels occur within the watershed. While concrete-lined flood control channels provide only limited value to biological resources, soft-bottom channel such as the Wilmington Drain provide habitat for plants and wildlife.

Wetland habitats within the Dominguez Watershed occur as scattered, isolated patches in an urban matrix. Freshwater marsh habitats occur where perennial water is available, most notably in Madrona Marsh and at Machado Lake in Harbor Regional Park. Small "pocket" wetlands are associated with drainage areas, and in some cases wetland vegetation occurs in flood control detention and retention basins.

Several locations within the watershed have been designated as Significant Ecological Areas (SEAs) or Environmentally Sensitive Areas (ESAs) by the Regional Water Quality Control Board and Los Angeles County. These areas are described first, and then followed by descriptions of other natural habitats in the following subsection.

Species observed during the field reconnaissance surveys and/or reported in studies for the different locations are briefly summarized in the following subsections, and the complete species lists are given in Appendix B.

2.4.2.2 Significant Ecological Areas and Environmentally Sensitive Areas

Significant Ecological Areas (SEAs) are defined in the Land Use and Open Space Elements of the Los Angeles County General Plan. The criteria used to designate SEAs include the presence of rare plant or animal species, sensitive or rare habitat types, and the importance of the area to game species or fisheries.

Environmentally Sensitive Areas (ESAs) are defined in the Standard Urban Storm Water Mitigation Plan for Los Angeles County and Cities in Los Angeles County as an *"Area of Special Biological Significance by the State Water Resources Control Board (Water Quality Control Plan, Los Angeles Region: Basin Plan for the Coastal Watersheds of Los Angeles and Ventura Counties (1994) and amendments) or an area designated as an Area of Ecological Significance by the County of Los Angeles (Los Angeles County Significant Areas Study, Los Angeles County Department of Regional Planning (1976) and amendments) or an area designated as a significant natural area by the California Resources Agency."*

Five sites within and immediately adjacent to the Dominguez Watershed were designated as Significant Ecological Areas (SEA) by the Los Angeles Regional Water Quality Control Board (February 29, 2000) based on data from the California Department of Fish and Game, State Water Resources Control Board, and Los Angeles County Department of Regional Planning. These included Madrona Marsh (SEA 36), Harbor Lake Regional Park (SEA 35), Rolling Hills Canyons (SEA 31), Terminal Island (SEA 33), and Palos Verdes Peninsula Coastline (SEA 34). The City of Rolling Hills Estates designated two areas within the watershed boundaries as Environmentally Sensitive Areas (ESAs): Rolling Hills Canyons (also a Los Angeles County SEA) and Linden H. Chandler Preserve.

The locations of the SEA's and ESA's within the watershed are shown on Figure 2.4-1, and are described below with two exceptions. The Terminal Island SEA is not shown on Figure 2.4-1 because it is not considered a valid designation at this time. It was originally designated in 1976 because the endangered California least tern nested there. However, least terns have not used that area since 1995, when they switched to a location at Pier 400 within the Port of Los Angeles. They have been nesting at Pier 400 since 1995 (Keane Biological Consulting 2000). Although not designated at this time, the location where least terns nest on Pier 400 should be considered a SEA. The Palos Verdes Peninsula Coastline SEA was not shown on Figure 2.4-1 because it is adjacent, but outside the watershed boundaries (D. Rydman, LACDPW, personal communication 2003).

Madrona Marsh

The Madrona Marsh is a vernal marsh preserve located in the City of Torrance near the intersection of Sepulveda Boulevard and Madrona Avenue (Figure 2.4-2). The preserve encompasses approximately 17.6 hectares (43.5 acres) and includes willow riparian habitats, vernal marsh and pool habitats, and upland areas. Friends of Madrona Marsh, the City of Torrance, and others worked to save Madrona Marsh from development and the City has served as steward of the land since 1986. The Madrona Marsh Nature Center opened its doors in April 2001, and provides educational outreach. Volunteers are active participants in restoration of lands within the preserve, including removal of invasive plant species and revegetation with native plants.

Madrona Marsh is the last remaining vernal marsh in Los Angeles County. During the winter rainy season, deep-water ponds form at lower elevations in the southwest portion of the site. Native vegetation is abundant and diverse on the site and includes freshwater marsh species such as tule (*Scirpus* sp.) and rush (*Eleocharis* sp.); riparian trees such as black willow (*Salix gooddingii*), and Fremont cottonwood (*Populus fremontii*), and upland species such as lemonadeberry (*Rhus integrifolia*).

Restoration efforts conducted on the site focus on removing exotic vegetation and restoring native back-dune habitat in areas of annual grassland. Planted native species observed on the site include deerweed (*Lotus scoparius*), bladderpod (*Isomeris arborea*), coastal dune buckwheat (*Eriogonum parvifolium*), and coastal bush lupine (*Lupinus chamissonis*). The most abundant exotic vegetation noted at the site during the February 2003 site visit was non-native grass including slender wild oats (*Avena barbata*) and ripgut grass (*Bromus diandrus*).

The Madrona Marsh is an island of natural habitat for wildlife surrounded by an urban setting. Its relatively large size allows for wildlife species to seek refuge from the adjacent human disturbances. This site has been monitored throughout many years, giving rise to comprehensive lists of plants and wildlife, that have been observed, at least at one time, at Madrona Marsh. For example, over 90 species of plants, 232 species of birds, 58 taxa of aquatic insects, and 30 species of butterflies have been reported (species lists provided by Tracy Drake, Nature Center Manager, City of Torrance Parks and Recreation Department).

Several species of aquatic birds have been observed within the ponds on the site including mallard (*Anas platyrhynchos*), gadwall (*Anas strepera*), American wigeon (*Anas americana*), northern shoveler (*Anas clypeata*), and cinnamon teal (*Anas cyanoptera*). The ponds also provide habitat for amphibian species including the Pacific treefrog (*Pseudacris regilla*). The ponds also support non-native species including the bullfrog (*Rana catesbeiana*) and red-eared slider (*Trachemys scripta elegans*). Western toads (*Bufo boreas*) also are seen at the preserve. As a precautionary method for disease, the Greater Los Angeles County Vector Control District has introduced mosquitofish (*Gambusia affinis*) into the ponds. These fish have been noted to have a negative affect on native fauna through food competition and direct predation (Gamradt and Kats 1996), and recently impacted aquatic invertebrates in several vernal pools during the 2002-2003 winter season (T. Drake, personal communication 2003).

September 2002

February 2003

Volunteer checking native plant seedlings.

Figure 2.4-2. Typical views of Madrona Marsh.

Herons and egrets also forage at the site. Many raptor species have been observed in the area including American kestrel (*Falco sparverius*), osprey (*Pandion haliaetus*), white-tailed kite (*Elanus leucurus*), Cooper's hawk (*Accipiter cooperii*), and red-tailed hawk (*Buteo jamaicensis*). The dense riparian vegetation provides cover and foraging habitat for several other species including yellow-rumped warbler (*Dendroica coronata*), Townsend's warbler (*Dendroica townsendi*), Pacific-slope flycatcher (*Empidonax difficilis*), and many other birds belonging to the flycatcher and vireo families. The tules provide habitat for the marsh wren (*Cistothorus palustris*), red-winged blackbird (*Agelaius phoeniceus*), and tri-colored blackbird (*Agelaius tricolor*).

The Madrona Marsh serves as a magnet for birds in the Los Angeles County region and continues to provide a natural refuge from the great amount of urbanization that surrounds the site. Some of the birds that bred at the marsh in 2002 included mallard (*Anas platyrhynchos*), American coot (*Fulica americana*), killdeer (*Charadrius vociferus*), Anna's humingbird (*Calypte anna*), Allen's humingbird (*Selasphorus sasin*), downy woodpecker (*Picoides pubescens*), black phoebe (*Sayornis nigricans*), western scrub jay (*Amphelocoma californica*), common raven (*Corvus corax*), bushtits (*Psaltriparus minimus*), and northern mockingbird (*Mimus polyglottos*) (2002 bird checklist Madrona Marsh).

Harbor Regional Park

Ken Malloy Harbor Regional Park (KMHRP), located in Wilmington and Harbor City, is operated by the City of Los Angeles Department of Recreation and Parks. The park is 93 hectares (231 acres) in size, and contains a large freshwater lake (Machado Lake) with extensive freshwater marsh habitats (Figure 2.4-3). Willow woodland and scrub habitat borders much of the east side of the lake. The park also includes recreational facilities such as picnic areas and viewing kiosks in upland areas. The regional park is the result of conservation lobbying by the Izaak Walton League and the acquisition of Bixby Slough by the City of Los Angeles, who began developing Harbor Regional Park in 1953. The lake within the park was named Machado Lake in 1989 in honor of the Machado family's historic connection to the site, and the park was renamed Ken Malloy Harbor Regional Park in 1992 to honor an individual who was a long-time advocate of the park (Parsons 2002).

KMHRP provides a large expanse of natural habitat for wildlife surrounded by an urban setting. The perennial lake with its dense tules and riparian woodlands provide habitat for several wildlife species. Machado Lake is officially designated as an Audubon Important Bird Area. Over 200 species of plants were observed in 2001 (Parsons 2002). Over 300 bird species have been recorded at KMHRP, and 60 of these nested at the park in the last decade (Parsons 2002). Approximately, 200 species of birds occur at the park annually (Palos Verdes/South Bay Audubon 2001).

Several species of aquatic birds have been observed utilizing the aquatic habitat of Machado Lake including the cinnamon teal, eared grebe (*Podiceps nigricollis*), least bittern (*Botaurus lentiginosus*), black-crowned night-heron (*Nycticorax nycticorax*), and ruddy duck (*Oxyura jamaicensis*). The dense riparian vegetation provides cover and foraging habitat for several other species including Townsend's warbler, northern flicker (*Colaptes auratus*), ruby-crowned kinglet (*Regulus calendula*), and common yellowthroat (*Geothlypis trichas*).

The California least tern (*Sterna antillarum browni*), a federal- and state-listed endangered bird, uses the park for foraging, and the endangered Least Bell's vireo was present there in 2002 (A. Hoecker, USFWS, personal communication, 2003). Many raptor species have been observed in the area including the osprey, white-tailed kite and Cooper's hawk.

I Street drain

I Street drain area (note trash after rain)

Figure 2.4-3. Typical views of the Ken Malloy Harbor Regional Park.

Recent records of birds breeding at the KMHRP include American coot, common moorhen (*Gallinula chloropus*), pied-billed grebe (*Podilymbus podiceps*), black-crowned night heron (*Nycticorax nycticorax*), killdeer, red-tailed hawk, American kestrel, cowbird (*Molothrus ater*), mourning dove (*Zenaida macroura*), rock dove (*Columba livia*), Anna's humingbird, northern mockingbird, European starling (*Sturnus vulgaris*), western meadowlark (*Sturnella neglecta*), California towhee (*Pipilo crissalis*), bushtit, American robin (*Turdus migratorius*), house finch (*Carpodacus mexicanus*), song sparrow (*Melospiza melodia*), least bittern (*Ixobrynchus exilis*), blue-winged teal (*Anas discors*), cinnamon teal (*A. cyanoptera*), ruddy duck (*Oxyura jamaicensis*), marsh wren (*Cistothorus paulustris*), common yellowthroat (*Geothlypis trichas*), tri-colored blackbird (*Agelaius tricolor*), great-tailed grackle (*Quisicalus mexicanus*) and house sparrow (*Passer domesticus*) (Heindel 2002, Parsons 2002).

Only exotic fish species live in the lake including carp (*Cyprinus carpio*), goldfish (*Carassius auratus*), green sunfish (*Lepomis cyanellus*), bluegill (*L. macrohirus*), large-mouthed bass (*Micropterus salmoides*), channel catfish (*Ictalurus punctatus*), and black bullhead (*I. melas*) (Parsons 2002). Mosquitofish (*Gambusia affinis*.) have been introduced into the lake to control potential mosquito-transferred diseases. The water found within the lake has been historically polluted due to the large amount of industrial and urban run-off from surrounding areas. Due to high pesticide concentrations in fish, adult males are warned not to eat more than one fish per day from the lake, and pregnant women and children are discouraged from eating any fish from the lake (Parsons 2002).

Insect diversity at KMHRP is very high. One typical wetland related group, the dragonflies, affords one example. At least ten species are known from the park: mosaic darner (*Aeshna* spp.), flame skimmer (*Libellula saturate*), green darner (*Anax junius*), variegated meadow hawk (*Sympetrum corruptum*), red saddlebags (*Tiamea onustra*), black saddlebags (*T. lacerate*), blue dasher (*Pachydiplax longipennis*), wandering glider (*Pantala flavescens*), spot-winged glider (*P. hymenaea*), western pond hawk (*Erythemis collocate*), and blue-eyed darner (*Aeshna multicolor*). In addition, Audubon's annual Palos Verdes-South Bay butterfly counts consistently show a greater diversity of species at KMHRP than anywhere else in the region.

Six species of amphibians and reptiles were noted in 2001, including western toad, Pacific tree frog, western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*), alligator lizard (*Elgaria multicarinata*), and gopher snake (*Pituophis melanoleucus*) (Parsons 2002). Water snakes (*Natrix* spp.), although not observed in 2001, have been reported to be serious pests in Machado Lake (*ibid.*).

Twelve species of mammals were observed at the park in 2001, and 16 species have historic occurrence (Parsons 2002). Commonly observed mammals include opossum (*didelphis virginiensis virginiensis*), raccoon (*Procyon lotor*), California ground squirrel (*Spermophilus beecheyi beecheyi*), Botta's pocket gopher (*Thomomys bottae bottae*), western harvest mouse (*Reithrodontomys megalotis longicauda*), deer mice (*Peromyscus* spp.), brush rabbit (*Sylvilagus bachmani*), and Audubon's cottontail (*S. auduboni*).

Several areas have been established within KMHRP as off-site mitigation areas for environmental impacts associated with other projects. Some of the mitigation areas have not been successful. For example, a wetland area south of Machado Lake totaling 1.2 hectares (3 acres) has only been partially successful. Six out of eight planted areas were planted but the plants did not survive.

Two areas along the south end of the park represent potential enhancement locations. One site located south of the campground and Izaak Walton League wildlife area, is known as the Tosco property. This upland area has ruderal vegetation, which transitions into riparian woodland.

A second location is at the southeast corner of the park, known as the I Street Drain. The I Street Drain conveys flows to the southeast corner of the park. A foot trail built by Los Angeles Harbor College students follows the channel. The vegetation consists of a dense canopy of mature black and arroyo willows, along with a variety of non-native tree species such as Canary Island date palm (*Phoenix canariensis*), Chinese elm (*Ulmus parvifolia*), and eucalyptus. The understory is open with occasional mule fat and a variety of weed species such as castor bean. The dense riparian cover provides refuge for wildlife species. Anna's hummingbird and ruby-crowned kinglet were observed during the reconnaissance field visit. The mature willows and other tall trees at this site serve as suitable perching, and possible nesting, habitat for raptor species. A red-shouldered hawk also was observed during the site visit. Considerable trash washed into this wetland area after the 2002-2003 winter rains (Figure 2.4-2).

The KMHRP suffers from several problems (Parsons 2002), including:
- Water quality impairment.
- Degraded habitat, which is the result of off road vehicles, homeless use, and proliferation of exotic species.
- Mosquitos, which may be linked to dense stands of tules.
- Contaminated fish (the lake is posted with warnings about the risk of eating fish from the lake).
- Feral domestic cats (*Felis catus*) and dogs (*Canis familiaris*), which prey on wildlife at the park.

A Master Plan improvement program was recently developed to guide water quality improvement, mosquito control, habitat restoration, park facilities improvements, and administrative improvement at the KMHRP (Parsons 2002).

Rolling Hills Canyons

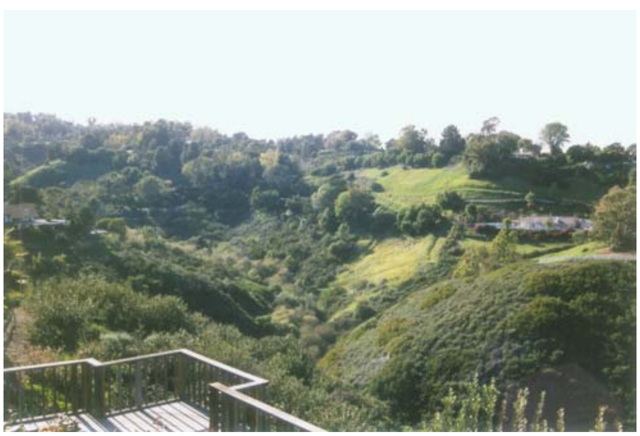
The Rolling Hills Canyons (Figure 2.4-4) encompasses a series of canyons on the Palos Verdes Peninsula including Dodson, Colt, and Miraleste Canyons on the east facing slopes, and Sepulveda, Agua Manga, Chadwick and George F. Canyons on the north facing slopes of the peninsula (Engleman and Nelson 1976). Most of the canyons are privately owned, and surrounded by residential development. The vegetation has had moderate adverse impacts due to usage by local residents and their pets (*ibid.*). The Palos Verdes Peninsula Land Conservancy operates a 14.6 acre (36-acre) preserve in George F. Canyon. The preserve features pedestrian and equestrian nature trails through willow riparian and coastal sage scrub habitats (http://www.pvplc.org).

These canyons support relatively undisturbed coastal sage scrub, chaparral, and riparian communities in which numerous wildlife species occur. Several sensitive species exist, or have the potential to exist, in these areas including the coastal cactus wren (*Campylorhynchus brunneicapillus couesi*), coastal California gnatcatcher (*Polioptila californica californica*), San Diego horned lizard (*Phrynosoma coronatum blainvillei*), San Diego desert woodrat (*Neotoma lepida intermedia*), Pacific pocket mouse (*Perognathus longimembris pacificus*), Allen's hummingbird, and loggerhead shrike (*Lanius ludovicianus*). The Rolling Hills Canyons SEA provides suitable foraging habitat for raptor species. The willow riparian areas at the bottom of the canyons support an array of bird species including sensitive species such as least bell's vireo (*Vireo bellii pusillus*) and southwestern willow flycatcher (*Empidonax traillii extimus*).

Linden H. Chandler Preserve

The Linden H. Chandler Preserve is an 11.3-hectare (28-acre) nature preserve located at the terminus of Buckskin Lane in Rolling Hills. The site includes grasslands and riparian habitats, and is the subject of restoration efforts coordinated by the Palos Verdes Peninsula Land Conservancy. The site was designated as an ESA by the City of Rolling Hills Estates. The preserve is valuable to wildlife resources. The area provides suitable foraging habitat for several bird species, including raptors. As part of the recovery plan for the endangered Palos Verdes blue butterfly (*Glaucopsyche lygdamus palosverdesensis*), larval food plants have been augmented on site and the butterfly has been introduced.

George F. Canyon Preserve



Rolling Hills Canyons

Figure 2.4-4. Typical views of canyon habitats within the Dominguez Watershed.

2.4.2.3 Los Angeles and Long Beach Harbors

Los Angeles and Long Beach Harbors are similar in size (3,035 and 3,076 hectares [7,500 and 7,600 acres] respectively), and combined have an open water area of approximately 3,289 hectares (8,128 acres). The open waters of the harbors are within San Pedro Bay. A small beach (Cabrillo Beach), salt marsh, and wetland also occur within the harbor complex (Figure 2.4-5).

San Pedro Bay

A total of 74 species of fish were collected in the harbors in 2000 (MEC 2002b). Pelagic schooling fish ranged in high abundances throughout the harbor complex, while demersal fish were more common in the deepwater habitats of the outer and middle harbor areas. The shallow waters of the harbors provide an important nursery habitat for a variety of species including California halibut and queenfish). This is due in large part to greater habitat heterogeneity associated with shallow water habitats, which are adjacent to rock riprap and/or vegetated areas. The most abundant species in the harbor included northern anchovy (*Engraulis mordax*), white croaker (*Genyonemus lineatus*), queenfish (*Seriphus politus*), topsmelt (*Atherinops affinis*), Pacific sardine (*Sardinops sagax*), salema (*Xenistius californiensis*), white surfperch (*Phanerodon furcatus*), and shiner surfperch (*Cymatogaster aggregata*). Other relatively abundant commercially and recreationally important species included California halibut (*Paralichthys californicus*), barred sand bass (*Paralabrax nebulifer*), and California corbina (*Menticirrhus undulatus*). The only exotic fish species present in the harbors was the yellowfin goby (*Acanthogobius flavimanus*), a native to Japan, Korea, and northern China (Miller and Lea 1972, Eschmeyer et al. 1983, MEC 2002b).

Fish consumption advisories are posted warning against eating white croaker caught from the harbors due to contamination from DDT.

Over 400 species of benthic infauna and larger macroinvertebrates were reported in Long Beach and Los Angeles harbors in 2000 (MEC 2002b). Over the past half century a steady improvement in benthic habitat quality of the harbors has been demonstrated by increased diversity and less dominance by pollution-tolerant benthic infauna species. Non-indigenous faunas potentially comprise about 15 percent of the invertebrate species that inhabit the harbors. A few of these dominant species include the polychaete *Pseudopolydora paucibranchiata* and the clam *Theora lubrica*.

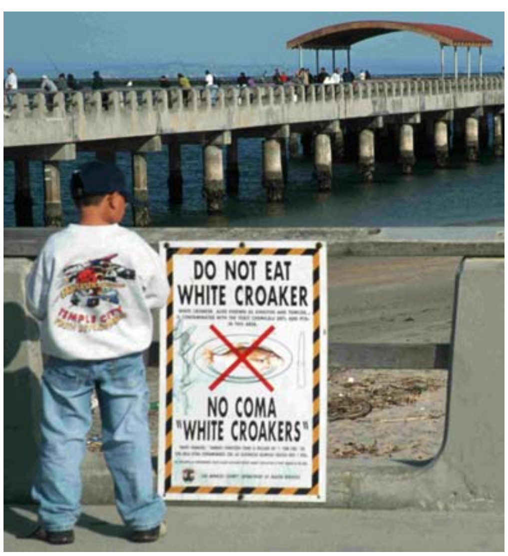
The harbor areas exhibiting the highest quality for benthic communities are in the created Shallow Water Habitats in Long Beach and Los Angeles Harbors and in the deep open waters of both harbors. These Shallow Water Habitats were created as part of mitigation for construction and channel deepening projects and can be found near Pier 300, the San Pedro Breakwater, and on the east side of Pier 400. While much improvement has occurred in the harbors, polluted and “semi-healthy” areas still exist. The Consolidated Slip of Los Angeles Harbor remains the most polluted while “semi-healthy” areas exist in Cerritos Channel of the inner harbor, and in confined basins and slips in both harbors. The spatial extent of these poorer habitat areas are not as widespread today as they were in the 1950s (MEC 2002b).

Overview of Harbor Habitats

California least tern nesting site at Pier 400

Cabrillo Wetlands

Cabrillo Beach



Cabrillo Pier

22nd Street Wetlands

Figure 2.4-5. Typical views of habitats within Los Angeles and Long Beach Harbors.

The harbors provide valuable habitat for breeding, resting, and foraging for over 100 bird species. Three species are endangered including the American peregrine falcon (*Falco peregrinus anatum*), California brown pelican (*Pelecanus occidentalis californicus*), and California least tern. The most abundant bird species observed in the harbors in 2000 included the western gull (*Larus occidentalis*), Heermann's gull (*L. heermanni*), California gull (*L. californicus*), elegant tern (*Sterna elegans*), California brown pelican, western grebe (*Aechmophorus occidentalis*), Brant's cormorant (*Phalacrocorax penicillatus*), double-crested cormorant (*P. auritus*), and the surf scoter (*Melanitta perspicillata*). Most of these birds congregated along the breakwaters due to the presence of large amounts of riprap (MEC 2002b). Sensitive species that nest within the harbor complex include the endangered American peregrine falcon (nests on bridges); endangered California least tern (nests on Pier 400 within Los Angeles Harbor); great blue heron (*Ardea herodias*), and black-crowned night heron (*Nycticorax nycticorax*) (nests along Long Beach West Basin); black oystercatcher (*Haematopus bachmani*) (nests on breakwater); Caspian tern (*Sterna caspia*), elegant tern (*Sterna elegans*), and black skimmer (*Rynchops niger*) (nests on Pier 400).

Bird abundance may differ between years related to variations in the migratory populations of some species. Other changes in abundance represent longer-term trends. MEC (2002b) noted in their comparison of survey data collected since 1973 that there have been long-term decreases in the abundance of some species (e.g., surf scoter, Heerman's gull) that may relate to dredging activities in the harbors and/or reduction in particulates associated with improved wastewater quality from the TITP and/or the reduction of cannery waste discharges. Other species such as terns have experienced long-term increases in abundance within the harbors that relate to an increase in protected nesting habitat. Increases in the abundance of the California brown pelican have occurred along the coast as a result of decreases in DDT concentrations in their food resources.

Kelp and macroalgal communities are distributed mainly along the riprap shorelines, breakwaters, and pier structures in the harbors (MEC 2002b). True kelp communities are restricted to the outermost portions of the harbors where giant kelp forms a principal component of macroalgal assemblages. Giant kelp (*Macrocystis pyrifera*) communities are not overly abundant in either Port. While algal communities exhibit year-round presence, there is substantial seasonality to the communities with growth in the spring and a decline in the summer months. Eelgrass (*Zostera marina*) habitat occurs in shallow waters offshore Cabrillo Beach and within the Pier 300 Shallow Water Habitat in Los Angeles Harbor. Presence of these beds occur year-round, but exhibit a relatively strong seasonal variation in overall area.

Cabrillo Salt Marsh Mitigation Site

The Cabrillo Salt Marsh was created approximately fifteen years ago, concurrently with construction of the Los Angeles City Marina in the west channel of the Los Angeles Harbor. This site is 1.2 hectares (3 acres) in size and consists of lagoon and salt marsh habitats (Figure 2.4-5). Topsmelt and goby fish occur in the lagoon (MEC 1988).

22nd Street Wetland

Water seepage from an underground source supported a small stand of wetland vegetation along the base of the bluff along Crescent Avenue (Figure 2.4-5). Red-winged blackbirds and other birds use the site, and mosquitofish have been observed within waters at the site (C. Boeauregard-Covit, personal communication 2003). The wetland vegetation was inadvertently removed by maintenance workers, and is currently being restored by the Port of Los Angeles.

2.4.2.4 Major Channels

Two major channels, Dominguez Channel and Wilmington Drain occur within the watershed. Habitats associated with the Dominguez Channel and its tributaries, and the Wilmington Drain are described below.

Dominguez Channel

Dominguez Channel is approximately 24 kilometers (15 miles) long and is fed by several tributary channels, most notably the Torrance Lateral, Del Amo Lateral, Victoria Creek, 132nd and 135th Street Drains.

Dominguez Channel is concrete-lined from its origin in Hawthorne to approximately Vermont Street in the City of Gardena. The channel, which runs approximately 3.2 to 3.9 meters (10.5 to 13 feet) below the surface grade is protected on each side by fencing. No biological resources occur within and few resources are associated with the upper Dominguez Channel or its tributary channels (132nd and 135th Street Drains), which are concrete-lined.

From Vermont Street downstream to Los Angeles Harbor, Dominguez Channel has a soft-bottom with riprap banks, and is estuarine from tidal influence (Figure 2.4-6). Dominguez Channel empties into the Consolidated Slip in Los Angeles Harbor. Mussels grow on pilings associated with road crossings, and unidentified fish have been seen in the channel. The channel banks are unvegetated except for incidental ruderal and exotic species (e.g., palms). A total of 43 species of birds were observed by private citizens during lunch breaks at the park and ride near Vermont and Artesia Boulevard during 2001 and 2002 (data provided by LACDPW). The most abundant species included western grebe, double-crested cormorant, snowy egret (*Egretta thula*), mallard, cinnamon teal (*Anas cyanoptera*), American coot, black-necked stilt (*Himantopus mexicanus*), least sandpiper (*Calidris minutilla*), western sandpiper (*Calidris mauri*), western gull (*Larus occidentalis*), ring-billed gull (*L. delawarensis*), and European starling (*Sturnus vulgaris*). Ground squirrels were abundant along the banks of the channel.

The tributary channels (i.e., Torrance and Del Amo Laterals, Victoria Creek) to the lower watershed are concrete-lined and lack biological resources.

Wilmington Drain

Canada De Palos Verdes is a channel that feeds into Machado Lake from the north, but is more commonly referred to as the Wilmington Drain. The Wilmington Drain is concrete-lined from its origin south of Sepulveda Boulevard (between Normandie and Vermont Avenues) to where it crosses under the Harbor (110) Freeway north of Lomita Boulevard (refer to Figure 2.3-7). Consequently, the channel has little biological value in its upstream reaches.

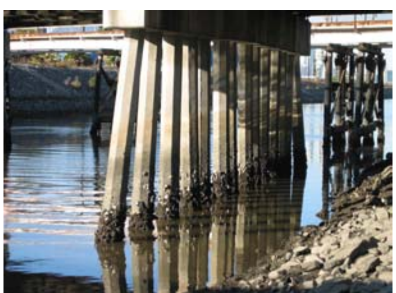
The channel is soft bottom with natural side banks from that point under the Harbor Freeway (just north of Lomita Boulevard) to where it empties into Machado Lake (Figure 2.4-7). This area has been designated as the Wilmington Drain Waterway and Wildlife Area by the Los Angeles County Flood Control District. This area has been characterized as 65 percent mature riparian woodland, 5 percent riparian scrub, 15 percent freshwater marsh, and 15 percent ruderal (weedy) vegetation with medium biological value due to moderate presence of native riparian vegetation and wildlife, but with little to no adjacent natural open space (Bon Terra 1997). The site visit in December 2002 confirmed that this characterization is representative of current conditions.


Drainage downstream of Artesia Boulevard


Downstream of Vermont Avenue


Torrance lateral


Downstream of Wilmington Avenue



Downstream of 223rd Street


Consolidated Slip

Figure 2.4-6. Typical views of habitats along Dominguez Channel downstream of Artesia Boulevard.


North of Lomita Boulevard (view north)


North of Lomita Boulevard (view north)


South of Lomita Boulevard (view south)
-Note willows west of access road.


South of Pacific Coast Highway
(note trash along rolled chicken wire)


Between Lomita Boulevard and Pacific Coast Highway
(view north)

North of Pacific Coast Highway (note trash boom)

Figure 2.4-7. Typical views of the Wilmington Drain Waterway and Wildlife Area.

The portion of Wilmington Drain north of Lomita Boulevard to the Harbor Freeway has a moderate band of riparian vegetation on the west side of the channel. Numerous large, mature black willows and mule fat (*Baccharis salicifolia*) provide dense cover. Exotic species include large clumps of castor bean (*Ricinus communis*), and fennel (*Foeniculum vulgare*) and black mustard along the banks. A narrow foot-trail extends from Lomita Boulevard northward along the west side of the channel; homeless use (bedrolls, trash, individuals) of the area was noted during the December 2002 site visit. The east side of the channel is relatively wide, and was dominated by black mustard (*Brassica nigra*) during the site visit.

South of Lomita Boulevard, riparian woodland occurs on both sides of the channel, and localized areas with freshwater marsh occur. Disturbed areas along the banks lack native vegetation; those areas are maintained for flood control purposes (D. Rydman, LACDPW, personal communication 2003). A dirt access road runs between Lomita Boulevard and Pacific Coast Highway, which is used by the County for flood control maintenance. A large upland area immediately south of Lomita Boulevard and west of the channel supports several large remnant black willows. Occasional invasive species occur along the channel and in the upland area at this location, including myoporum (M*yoporum laetum*), eucalyptus (*Eucalyptus* sp.), and bermuda grass (*Cynodon dactylon*). A stand of giant reed (*Arundo donax*) occurs on private property immediately adjacent to the channel on the west side.

The watercourse is deep and clear of vegetation just north of Pacific Coast Highway, and riparian vegetation occurs along both banks. A trash boom spans the width of the channel and collects trash. South of Pacific Coast Highway, the channel is within the Ken Malloy Harbor Regional Park. The remains of several break-away fences constructed of chicken wire collect trash just south of the road culvert. Dense patches of cattails (*Typha* sp.) occur within the channel in this area, with several small individual willows on the banks.

The dense understory and upper canopy within the Wilmington Drain provides an abundant amount of refuge for birds, and the area is a well known spot for bird watching. A total of 21 species of birds was observed during a survey of the channel in 1997; the most abundant species were mallard, American coot, bushtit, house finch, and European starling (Bon Terra 1997). Several species also were detected during the December 2002 reconnaissance survey. Aquatic birds utilized the open channel and its vegetated margins including mallards, cinnamon teals, snowy egrets, and American coots. The larger trees bordering the drain provide suitable perching, and possible nesting, habitat for raptor species including the red-tailed hawk and American kestrel. The riparian vegetation also provides cover and foraging habitat for several other species such as yellow-rumped warbler, Townsend's warbler, and ruby-crowned kinglet.

The Wilmington Drain area is scenic and has wildlife value. The area is posted against trespassing and loitering, and periodically is posted for clean up to discourage homeless use of the area. The area has been closed to public use because of the problems with homeless use of the area.

2.4.2.5 Pocket Wetlands

Pocket wetlands are typically associated with unlined portions of drainages throughout the watershed. Several pocket wetlands identified during the field visits are described below.

Chester Washington Golf Course Drain

Chester Washington Golf Course is located in the Athens District of Los Angeles along the north side of El Segundo Boulevard between Van Ness Avenue and Western Avenue (Figure 2.4-8). A short reach of the channel located north of the golf course boundary is concrete lined and culverted below the golf

Chester Washington Golf Course

Gardena Willows

Upstream end of Telco Wetlands

Upstream drain to Telco wetlands

Culverts from Gardena Willows to Telco wetlands (trash after rain)

Downstream end of Telco wetlands

Figure 2.4-8. Pocket wetlands within the Dominguez Watershed.

course entry road and much of the north portion of the golf course itself. A small stand of giant reed is present in the drainage north of the golf course boundary. Within the golf course, the channel reappears on the surface near the sixth tee, emerging from a culvert equipped with a trash rack. The channel downstream of this culvert remains a natural earthen bottom and side slope channel for approximately 91 meters (300 feet), where it is then culverted underground until it approaches the south end of the golf course near El Segundo Boulevard. The channel is open and unlined for the remaining 30 meters (100 feet) within the golf course, and is culverted beneath El Segundo Boulevard.

Vegetation in the aboveground portion of the channel within the golf course consists entirely of exotic trees and weed species. The most dominant species were eucalyptus trees and castor bean. A single small black willow was observed in the southern open channel area.

The non-culverted, vegetated portions of the Chester Washington Golf Course Drain provide good cover for wildlife species. Several bird species were observed at this site including the black phoebe, western scrub jay, northern mockingbird, American kestrel, yellow-rumped warbler, and lesser goldfinch (*Carduelis psaltria*). The larger, older trees within this area provide suitable nesting habitat for raptor species. Monarch butterflies may also use mature eucalyptus trees as aggregating or overwintering sites. However most of the major roost sites in this part of Los Angeles County lie outside the Dominguez Watershed; for example, at Point Fermin near Malaga Cove in Palos Verdes. Regular golf course maintenance activities are likely to negatively affect the water quality of the drainage. The use of fertilizers may have a negative affect on any resident amphibian species. The adjacent residential areas may also have a negative affect on native wildlife through the introduction of domestic animal including cats.

Gardena Willows Wetlands

The Gardena Willows wetlands is located near the intersection of Vermont at 176th Street (Figure 2.4-8). Volunteers currently maintain the site, and a small interpretive center is planned for an open area in the upland portion at the extreme west end of the site. This site includes approximately 3.6 hectares (nine acres) of riparian and wetland habitats, with an additional 1.6 hectares (four acres) of upland area. The upland areas were planted with coastal sage scrub species between 1997 and 1998. Native species in the upland portions of the site include California bush sunflower (*Encelia californica*), deerweed (*Lotus scoparius*), toyon (*Heteromeles arbuitfolia*), coast live oaks (*Quercus agrifolia*), and California buckwheat (*Eriogonum fasciculatum*). The riparian habitat is mature with large willows and bulrush in the wetter areas. The most visible exotic plant problem within the riparian habitat is English ivy (*Hedera helix)*, which grows up many of the trees. Fennel is common in the upland areas, particularly on the east side near Vermont Avenue.

The Gardena Willows Wetland site holds pools of water for much of the year. Several amphibian species have been documented to occur at this site due to the presence of aquatic habitat, including the black-bellied salamander (*Batrachoseps nigriventris*), bullfrog, Pacific treefrog, and western toad (*Bufo boreas*) (Jones and Stokes 1997). The dense riparian vegetation located at the site support adequate cover for several bird species including the common yellowthroat, Pacific-slope flycatcher, yellow warbler (*Dendroica petechia*), and downy woodpecker. The larger, older trees within this area may provide suitable nesting habitat for raptor species including the Cooper's hawk and red-shouldered hawk (*Buteo lineatus*). The relatively large area of this site allows for good refuge from the surrounding urban setting and human disturbances. The perimeter of the site is also fenced in order to limit the amount of human impacts directly affecting the wetland system.

Telco Wetland

The Telco Wetland (Figure 2.4-8), named for a telecommunications building located just north of the site, is partially supported by drainage from the Gardena Willows Wetland, which is culverted under Vermont Avenue into the site. A second, concrete-lined channel enters the area from the north. The wetland follows the drainage south to where it empties into Dominguez Channel. Along Vermont Avenue, a steep slope consisting of non-native grasses drops in elevation towards the drainage. The drainage is approximately 30 meters (100 feet) in length, and enters a culvert beneath Artesia Boulevard (Highway 91). Vegetation along the drainage is generally open, consisting primarily of several large black willows and a few Chinese elms forming an open canopy. The understory is sparsely vegetated with non-native grasses and ruderal species. Several California sycamores (*Platanus californica*) are planted at the top of the slope along Vermont Avenue. Sparse riparian vegetation occurs downstream from Artesia Boulevard; most of the area is disturbed with ruderal vegetation.

The wildlife value of this site is fairly low due to its relatively small size and proximity to the surrounding urban setting; however, several of the bird species observed at the Gardena Willows Wetland site may utilize the Telco Wetland site as well. Much of the area is heavily disturbed and was littered with trash and debris after the December 2002 rains.

Albertoni Farms

Albertoni Farms is located northwest of the intersection of Victoria Street and Avalon Boulevard in the City of Gardena (Figure 2.4-9). A drainage diagonally bisects a mobile home community, flowing from the northeast to the southwest corner of the park. The drainage is west of the Dominguez Hills. Native habitat is patchy in the channel. Bulrush is present along the low-flow line throughout most of the length of the channel. Many exotics are present in the channel including Peruvian pepper (*Schinus molle*), pampas grass, edible fig *(Ficus carica*), acacia (*Acacia baileyana*), and eucalyptus. Native species present include several large, old black willows and arroyo willow. Upland areas are generally weedy with castor bean, bermuda grass, and black mustard. Fennel also is abundant. A very broad area in the downstream portion of the channel is completely infested with Himilayan blackberry (*Rubus discolo*r), which forms a dense cover.

The existing riparian vegetation and mature exotic trees supports adequate cover for several bird species, including Anna's hummingbird, common yellowthroat, and ruby-crowned kinglet. A flock of nutmeg mannikin (*Lonchura punctulata*), an exotic bird species, was observed during the survey occupying the bulrush habitat located in the middle portion of the drainage. Other fairly common species of birds observed in the area of the drainage include black phoebe (*Sayornis nigricans*), scrub jay (*Aphelocoma coerulescens*), and northern mockingbird (*Mimus polyglottos*). A red-tailed hawk was seen soaring to the north. Several of the larger trees, including many exotic species, growing along the length of the drainage may be used by raptors for perching. Although confined to a narrow strip of open space habitat, the drainage and its adjacent upland habitat may support suitable foraging habitat for raptors. The riparian vegetation provides foraging habitat for woodlands raptors including Cooper's hawk and red-shouldered hawk. The more open areas may provide foraging opportunities for red-tailed hawks, which tend to search for small mammals from the air.

JWPCP Mitigation Wetland

The Joint Water Pollution Control Plant (JWPCP) Mitigation Marsh is located in the northeast quadrant formed by Lomita Boulevard and the Harbor Freeway (Figure 2.4-9). The marsh receives inflow from Wilmington Drain via a 6-inch pump and consists of a defined low-flow channel extending from the Wilmington Drain input location. The low channel is surrounded by higher benches supporting upland species. At the downstream (southern) end of the site, water in the low flow channel returns to the Wilmington Channel.

Blackberries

Albertoni Farms
near inlet

Viewing area

JWPCP Mitigation Wetland

Albertoni Farms near outlet

Lomita Vernal Pool remnant

Figure 2.4-9. Additional views of pocket wetlands within the Dominguez Watershed.

Native riparian species at this location include black and arroyo willow (*Salix gooddingii* and *S. laseolepis*), mule fat, and bulrush (*Scirpus* sp.). California sagebrush (*Artemisia californica*) is common on the higher benches. The site is fairly weedy with a variety of non-native species including castor bean, myoporum, pampas grass (*Cortaderia selloana*), and poison hemlock (*Conium maculatum*). Perennial pepperweed (*Lepidium latifolium*), a highly invasive member of the mustard family, was also observed at this location.

The existing riparian vegetation, consisting of mule fat and willow, supports adequate cover for several bird species, including mourning dove (*Zenaida macroura*), Anna's hummingbird, and common yellowthroat. The lowlands of the marsh provide suitable foraging areas for various sized birds including the great egret (*Casmerodius albus*) and song sparrow (*Melospiza melodia*). Mature non-native eucalyptus trees growing in the upland areas may support suitable habitat for nesting raptors species and herons. Black phoebes, marsh wrens, and scrub jays have also been observed at the site (Jones and Stokes 1996). Monarch butterflies (*Danaus plexippus)* may also use mature eucalyptus or sycamore trees for aggregation and overwintering sites.

Lomita Vernal Pool Remnant

The Lomita vernal pool remnant is a small undeveloped parcel fenced within a residential area. This location is a small part of the Los Angeles coastal prairie, which used to cover about 95 square kilometers (37 square miles) from Ballona Bluff to the Palos Verdes Peninsula (Mattoni and Longcore 1997). The site is dominated by non-native vegetation, primarily grasses and weedy ruderal vegetation. The City of Lomita General Plan states that sensitive habitat for the western spade-foot toad (*Spea hammondii*) occurs near City Hall, which corresponds to this degraded location.

2.4.2.6 Water Retention and Recharge Basins

Water retention and recharge basins located throughout the watershed are generally maintained for flood control or groundwater recharge purposes and are fenced to exclude public entry and use. Most of the basins are cleared of vegetation; however, several of the water retention basins support a small amount of native riparian vegetation and thus provide small islands of natural habitat. A brief description of several basins in the City of Torrance is provided below, and representative photographs are shown on Figure 2.4-10. The types of habitats found at these locations are considered typical of basins located elsewhere in the watershed. The wildlife observed at these basins were typical of urban settings and included American crow (*Corvus brachyrhynchos*), rock dove (*Columba livia*), European starling, mourning dove, house finch (*Carpodacus mexicanus*), western scrub jay, and black phoebe. A red-tailed hawk and American kestrel were observed at the Ocean Retention Basin; most of the basins provide suitable foraging habitat for raptor species.

Walteria Lake (City of Torrance)

Walteria Lake is located adjacent Lago Seco Park in the City of Torrance. The lake functions both as a water retention and recharge basin and is approximately 40 hectares (100 acres) in size. The basin is owned by Los Angeles County, and is hydraulically linked to Machado Lake. A small amount of riparian vegetation is present in the bottom of the basin. Vegetation on the sidewalls is generally composed of non-native grasses and occasional larger shrubs.

Amie Basin (City of Torrance)

Amie Basin is located at Spencer Street and Amie Avenue in the City of Torrance. It is primarily a nuisance-flow basin for retention of stormwater. It is constructed with steep concrete sidewalls, sloping down to a soft clay bottom. Riparian vegetation is present, but patchy at the bottom of the basin, and the side slopes and benches are generally devoid of vegetation. The native vegetation included some mule fat, willows, and sycamores. Some fennel was present in the basin.

Walteria Lake retention basin

El Dorado Detention Basin

Amie Detention Basin

Ocean Retention basin

Del Amo Detention Basin

Figure 2.4-10. Habitats at Torrance flood control detention basins.

El Dorado Detention (City of Torrance)

El Dorado Detention Basin is a relatively small basin and consists of a wide grassy slopes and base with numerous eucalyptus trees forming an open canopy.

Ocean Retention Basin (City of Torrance)

Ocean Retention Basin is a large, deep basin characterized by steep side slopes predominantly vegetated with non-native or ornamental species. The floor of the basin appears to be groomed on a regular basis and was essentially barren. Some native vegetation occurs at an inlet located at the northeast corner of the basin. A narrow strip of cattails, small willows, and mule fat extends from the opening of the inlet for approximately 15 meters (50 feet) on the basin floor.

Del Amo Detention Basin (City of Torrance)

Del Amo Detention Basin is a large deep basin with steep side slopes. The vegetation on the slopes is primarily non-native grasses with several large acacia (*Acacia longifolia*) shrubs. Several large willows and scattered mule fat occur on the floor of the basin. The basin held standing water at the time of the field visit.

2.4.3 Sensitive Species

2.4.3.1 Sensitive Plant Species

The literature review resulted in a list of 17 sensitive plant species that have the potential to occur within the Dominguez Watershed (Table 2.4-1). None of the sensitive plant species were observed during the reconnaissance surveys; however, southern tarplant (*Centromadia parryi* ssp. *australis*; = *Hemizonia p.*), a CNPS List 1B species, has been reported at two locations in the watershed. The potential for each species to occur in the watershed was evaluated based on the general guidelines described below.

Occurs: Species was observed within the watershed at the time of the survey. Current records of occurrence in CNDDB are also considered evidence of species presence.

High: Both a record exists of the species within the watershed or its immediate vicinity and the habitat requirements associated with the species occur within the watershed.

Moderate: Either a record exists of the species within the immediate vicinity of the watershed (approximately 8 kilometers [5 miles]) or the habitat requirements associated with the species occur within the watershed.

Low: No current records exist of the species occurring within the watershed or its immediate vicinity and/or habitats needed to support the species are limited or of poor quality.

Absent: Species was not observed during focused surveys conducted at an appropriate time for identification of the species or species is restricted to habitats that do not occur within the watershed.

Suitable habitats for most of these species occur within the watershed boundaries. Some habitat types are extremely limited, such as southern coastal bluff scrub, which is found only on ocean-facing bluffs at Cabrillo Beach in San Pedro. This habitat is also impacted by invasive exotic species and disturbance from recreational use. The potential for occurrence of species that occur in bluff scrub habitats was considered to be low unless the species was recently reported at a nearby location.

Table 2.4-1. Sensitive plant species potentially occurring within the Dominguez Watershed.

Scientific Name Common Name	Habitat and Distribution	Flower Season	Status Designation	Potential to Occur
Aphanisma blitoides Aphanisma	Annual herb occurring in coastal bluff scrub, coastal dunes, and coastal scrub (sandy habitats). Range includes coastal California counties from Santa Barbara south to Baja California, including the offshore islands	March - June	Fed: None CA: None CNPS: List 1B R-E-D: 2-2-2	Moderate. Limited suitable habitat occurs in San Pedro; however, the species was recorded as present on the Palos Verdes peninsula in remnant sage scrub habitat in 1992.
Astragalus tener var. titi Coastal dunes milk-vetch	Annual herb occurring in coastal bluff scrub, coastal dunes, and mesic coastal prairies. Reported range of the species is from coastal Monterey to San Diego counties.	March – May	Fed: END CA: END CNPS: List 1B R-E-D: 3-3-3	Low. Limited suitable habitat occurs in San Pedro. Last reported occurrence in the watershed was in 1903 at Hyde Park (near Inglewood).
Atriplex pacifica South coast saltscale	Annual herb occurring in coastal bluff scrub, coastal dunes, coastal scrub, and playa habitats in alkali soils. Reported range is southern California including the offshore islands, Baja California, and Arizona.	March - October	Fed: None CA: None CNPS: List 1B R-E-D: 3-2-2	Moderate. Limited suitable habitat occurs in San Pedro; however the species was observed in 1992 at Shoreline Park on the Palos Verdes Peninsula (CNDDB)
Atriplex parishii Parish's brittlescale	Annual herb occurring in chenopod scrub, playas, alkali meadows and vernal pools. Historic range from southern California to Baja California.	June – October	Fed: None CA: None CNPS: List 1B R-E-D: 3-3-2	Moderate. Limited suitable habitat occurs (Madrona Marsh); however, the species is presumed extinct (Hickman 1993), and has not been observed in southern California since 1993.
Atriplex serenana var. davidsonii Davidson's saltscale	Annual herb occurring in coastal bluff scrub and coastal scrub in alkaline soils. Known from a single collection on Santa Cruz Island in 1930 (CNPS). Also reported in San Pedro in 1906 (CNDDB)	April – October	Fed: None CA: None CNPS: List 1B R-E-D: 3-2-2	Low. Limited suitable habitat occurs within the watershed and the species has not been reported in the watershed area since a collection in 1906.
Centromadia parryi ssp. *australis* (=*Hemizona parryi* ssp. *australis*) Southern tarplant	Annual herb occurring at the boundaries of marshes and swamps; and in vernally mesic grasslands. The reported range of the species is coastal southern California from Santa Barbara County south to Baja California.	May - November	Fed: None CA: None CNPS: List 1B R-E-D: 3-3-2	Occurs. Species reported at Harbor Lake Regional Park in 1991 and at Madrona Marsh in 1997 (CNDDB). Species has a high potential to occur elsewhere in the watershed in marsh habitats.
Chaenactis glabriuscula var. orcuttiana Orcutt's pincushion	Annual herb occurring in coastal bluff scrub (sandy) and coastal dunes. Known from Ventura, Los Angeles, Orange, and San Diego counties; and Baja California.	January - August	Fed: None CA: None CNPS: List 1B R-E-D: 2-3-2	Low. Limited suitable habitat occurs within the watershed; historic record of occurrence in Manhattan Beach.
Cordylanthus maritimus ssp. maritumis Salt marsh bird's beak	Annual herb (hemiparasitic) occurring in coastal marshes and swamps. Limited to the higher zones of salt marsh habitat (CNDDB). Range is reported as San Luis Obispo to Baja California	May – October	Fed: END CA: END CNPS: List 1B R-E-D: 2-2-2	Low. Remnant salt marsh habitat may occur close to the coast; however, these habitats are likely highly disturbed. Last reported in the area in 1932 at a salt marsh in Long Beach (CNDDB)

Table 2.4-1. (Continued).

Scientific Name Common Name	Habitat and Distribution	Flower Season	Status Designation	Potential to Occur
Dithyrea maritime Beach spectaclepod	Perennial herb (rhizomatous) occurring in coastal dunes and coastal scrub (sandy) habitats. Range of the species is reported as San Luis Obispo south to Baja California, including the offshore islands.	March – May	Fed: [FSOC] CA: THR CNPS: List 1B R-E-D: 3-3-2	Low. Limited suitable habitat occurs within the watershed; historic record of occurrence in Hermosa Beach.
Dudleya virens ssp. Insularis Ilsnad Green Dudleya	Perennial herb occurring in coastal bluff scrub, and rocky coastal scrubs. Reported in Los Angeles County and on Catalina and San Nicholas Islands	April – June	Fed: None CA: None CNPS: List 1B R-E-D: 2-2-3	Moderate. Limited suitable habitat occurs within the watershed. Island green dudleya was report in coastal bluff scrub on the Palos Verdes Peninsula in 1992.
Fremontodendron mexicanum Mexican flannelbush	Evergreen shrub occurring in coniferous forests, chaparral, and woodlands on gabbroic, metavolcanic, or serpentinite soils. Reported range includes Monterey, Kern, Los Angeles, and Orange Counties, however, these reports are considered erroneous. Known from less than 15 observations in San Diego County and Baja California.	March – June	Fed: END CA: Rare CNPS: List 1B R-E-D: 3-3-2	Low. Limited suitable habitat occurs on the Palos Verdes Peninsula. A 1963 report from Palos Verdes may be a misidentification.
Lasthenia glabrata ssp. *coulteri* Coulter's goldfields	Annual herb occurring in coastal swamps (salt) and marshes, playas, and vernal pools. The species is known from San Luis Obispo south to Baja California, including the Santa Rosa Island.	February - June	Fed: None CA: None CNPS: List 1B R-E-D: 2-3-2	Moderate. Suitable habitat (marshes, playas, swamps) occur at several locations in the watershed; historic record of occurrence in a slough near Gardena.
Navarretia fossalis spreading navarretia	Annual herb occurring in vernal pools, chenopod scrubs, marshes and swamps, and playa habitats. May also occur in swales and ditches. Reported range is San Luis Obispo County (?) south to Baja California	April – June	Fed: THR CA: None CNPS: List 1B R-E-D: 2-3-2	High. Suitable habitat occurs within the watershed, primarily in uninvestigated fields or swales. The species was last reported in the watershed in 1963 at Rosecrans and Western Avenues in a grassy meadow.
Nemacaulis denudata var. denudata coast woolly-heads	Annual herb occurring in coastal dune habitats. Reported range of the species is Los Angeles, Orange, and San Diego counties. Also reported on Catalina Island and in Baja California.	April – September	Fed: None CA: None CNPS: List 1B R-E-D: 2-2-2	Low. Remnant coastal dune habitat may occur close to the coast; however, remaining habitat is likely highly disturbed and the species has not been reported in the watershed since 1905 on Terminal Island.

Table 2.4-1. (Continued).

Scientific Name Common Name	Habitat and Distribution	Flower Season	Status Designation	Potential to Occur
Orcuttia californica California orcutt grass	Annual herb restricted to vernal pools or vernal pool-like habitats. Reported range is southern and Baja California.	April – August	Fed: END CA: END CNPS: List 1B R-E-D: 3-3-2	Low. Suitable habitat occurs at Madrona Marsh; however, the species has not been recorded at that site. A 1946 record reported the species in a dry ditch near Western and Rosecrans Avenues; however a survey of this location in 1976 was negative (CNDDB)
Pentachaeta lyonii Lyon's pentachaeta	Annual herb occurring in coastal scrubs, chaparral and grassland. Known primarily from locations in the Santa Monica Mountains and Simi Hills.	March – August	Fed: END CA: END CNPS: List 1B R-E-D: 3-3-3	Moderate. Limited suitable habitat occurs within the watershed; historic record of occurrence in San Pedro (type locality).
Phacelia stellaris Brand's phacelia	Annual herb occurring in coastal dunes and coastal scrub habitats. Reported range is Los Angeles and San Diego counties, into Baja California.	March – June	Fed: None CA: None CNPS: List 1B R-E-D: 3-3-2	Low. Limited suitable habitat occurs in the watershed. Historic record of the species occurring in Redondo Beach was reported in 1909.

Status Codes

Federal: (federal Endangered Species Act, USFWS):
- END: Federally listed, endangered.
- P-END: Proposed federal listed, endangered.
- THR: Federally listed, threatened.

State: (California Endangered Species Act, CDFG):
- END: State-listed, endangered.
- THR: State-listed, threatened.
- RARE: State-listed as rare (Listed "Rare" animals have been re-designated as Threatened, but Rare plants have retained the Rare designation.)

California Native Plant Society (CNPS):
- List 1A: Plants presumed extinct in California.
- List IB: Plants rare and endangered in California and throughout their range.
- List 2: Plants rare, threatened or endangered in California but more common elsewhere in their range.
- List 3: Plants about which we need more information; a review list.
- List 4: Plants of limited distribution; a watch list.

CNPS R-E-D Code:

Rarity
- 1: Rare, but found in sufficient numbers and distributed widely enough that the potential for extinction or extirpation is low at this time.
- 2: Occurrence confined to several populations or one extended population.
- 3: Occurrence limited to one or a few highly restricted populations, or present in such small numbers that it is seldom reported.

Endangerment
- 1: Not endangered.
- 2: Endangered in a portion of its range.
- 3: Endangered throughout its range.

Distribution
- 1: More or less widespread outside California.
- 2: Rare outside California.
- 3: Endemic to California (i.e., does not occur outside California).

General references: Hickman (ed.) 1993; Munz 1974; CNPSEI 2002; CNDDB 2002
U.S.G.S. 7 ½' Quads: Long Beach, San Pedro, Redondo Beach, Torrance, Inglewood

2.4.3.2 Sensitive Wildlife Species

The literature review resulted in a list of 38 sensitive wildlife species that have the potential to occur within the Dominguez Watershed (Table 2.4-2). The only sensitive species observed during the reconnaissance surveys for this project were the great egret and snowy egret. A sensitive species was considered as a potential inhabitant of the project site if its known geographical distribution encompassed part of the watershed or if its distribution was near the watershed boundaries and general habitat requirements of the species were present (such as the presence of roosting, nesting, or foraging habitat, or a permanent water source). Furthermore, the potential for each species to occur within the watershed was also assessed. The "potential for occurrence" ranking is based on the following criteria:

Absent: Species is concluded to be absent from the watershed based on failure to detect the species during focused surveys.

Low potential for occurrence: There are no recent or historical records of the species occurring within the watershed or its immediate vicinity and the diagnostic habitat requirements strongly associated with the species do not occur within the watershed or its immediate vicinity.

Moderate potential for occurrence: There is a recent or historical record of the species within the watershed or its immediate vicinity, or the watershed is within the species range and contains a varying amount of suitable habitat typically associated with the species.

High potential for occurrence: There is both a recent or historical record of the species in or in the immediate vicinity of the watershed, and/or the diagnostic habitat requirements strongly associated with the species occur in or in the immediate vicinity of the watershed.

Species present: The species was observed within the watershed at the time of the survey.

Table 2.4-2 contains a summary of the sensitive wildlife species and their potential to occur within the Dominguez Watershed. Suitable habitats for most of these species occur within the riparian vegetation associated with the watershed. However, there are several sensitive species that have the potential to occur within the upland habitats, primarily in areas supporting coastal sage scrub. Several of the following species are known, or have the potential, to nest within the Dominguez Watershed. Others merely use the watershed as foraging habitat.

Table 2.4-2. Sensitive wildlife species potentially occurring within the Dominguez Watershed.

Scientific Name	Common Name	Listing	Potential for Occurrence
CLASS INSECTA	INSECTS		
LYCAENIDAE *Glaucopsyche lygdamus palosverdesensis*	BLUE BUTTERFLIES Palos Verdes blue butterfly	FE	Moderate. This species is generally restricted to the cool, fog-shrouded seaward side of the Palos Verdes Peninsula. The larvae feed upon the seeds and flowers of the host plants (*Lotus scoparius* and *Astragalus trichopodus* var. *lonchus*), molting several times, and soon drop to the ground or enter locoweed seedpods to become pupae. The Palos Verdes blue butterfly has been almost extirpated from its range. The only known population is located near San Pedro on the Defense Fuel Support Point (DFSP) land managed by the Navy; however, suitable habitat may be present for this species in the Linden H. Chandler Preserve, Rolling Hills Canyons (SEA 31), and coastal bluffs along the Palos Verdes Peninsula coastline (SEA 34). These areas may be restored with coastal sage scrub vegetation, including both host plant species, in order to enhance habitat for the butterfly in the future.
DANAIDAE *Danaus plexippus*	MILKWEED BUTTERFLIES Monarch butterfly	*	High. Suitable winter roost sites occur throughout the Dominguez Watershed. Roosts are generally located in wind-protected tree groves (eucalyptus, monterey pine, cypress), with nectar and water sources nearby. Winter roost sites typically extend along the coast from northern Mendocino to Baja California, Mexico. The monarch butterfly has the potential to overwinter at all sites within the Dominguez Watershed containing mature eucalyptus or other large trees.
CLASS REPTILIA	REPTILES		
PHRYNOSOMATIDAE	HORNED, SAGEBRUSH AND FRINGE-TOED LIZARDS		
Phrynosoma coronatum blainvillei	San Diego horned lizard	CSC	High. This species typically inhabits coastal sage scrub and chaparral in arid and semi-arid climates. Prefers friable, rocky, or shallow sandy soils. The San Diego horned lizard may occur in coastal sage scrub located in the Linden H. Chandler Preserve, Rolling Hills Canyons (SEA 31), and coastal bluffs along the Palos Verdes Peninsula coastline (SEA 34).
CLASS AVES	BIRDS		
PHALACROCORACIDAE	CORMORANTS		
Phalacrocorax auritus (rookery site)	double-crested cormorant	CSC	Low (rookery site) - High (foraging). The California populations of this species typically breeds on the Channel and Coronado Islands. It is typically associated with lakes, streams, and coastal shores. The double-crested cormorant has been observed in Harbor Regional Park, Madrona Marsh, and in the Dominguez Channel near Vermont Ave and Artesia Blvd.

Table 2.4-2. (Continued).

Scientific Name	Common Name	Listing	Potential for Occurrence
CLASS AVES (Continued)	BIRDS		
PELECANIDAE *Pelecanus erythrorhynchos* (nesting colony)	PELICANS American white pelican	CSC	Low (nesting colony) - Moderate (foraging). It typically breeds in northern territories with sporadic breeding in southern California. This species typically inhabits inland lakes as well as salt ponds and marine habitats. They require flat or gently sloping nest-sites with loose soil, which lack shrubs or other obstructions that would impede flight take-off. The American white pelican has been observed foraging in Harbor Regional Park.
Pelecanus occidentalis californicus (nesting colony)	California brown pelican	SE, FE	Low (nesting colony) - High (foraging). This species is typically found in estuarine and marine waters along the California coast. It typically breeds on the Channel Islands. The California brown pelican has been observed foraging in Harbor Regional Park and Madrona Marsh.
TROGLODYTIDAE *Campylorhynchus brunneicapillus couesi*	WRENS coastal cactus wren	CSC	High. This species is an inhabitant of coastal sage scrub and chaparral containing cholla or prickly pear cactus. Suitable nesting habitat is present for the coastal cactus wren in the Linden H. Chandler Preserve, Rolling Hills Canyons (SEA 31), and coastal bluffs along the Palos Verdes Peninsula coastline (SEA 34).
ICTERIDAE *Agelaius tricolor* (nesting)	BLACKBIRDS tricolored blackbird	(FSC)	High (nesting). This species typically breeds near fresh water, preferably in emergent wetland vegetation with tall, dense cattails or bulrush. Suitable nesting habitat is present at both the Harbor Regional Park and Madrona Marsh. This species has been observed nesting at Harbor Regional Park and foraging at Madrona Marsh.
LARIDAE	SKUAS, GULLS, TERNS, SKIMMERS		
Larus californicus (nesting colony)	California gull	CSC	Low (nesting colony) - High (foraging). It typically breeds in northern and inland territories and forages over open water habitats. It consumes a variety of items including insects, aquatic invertebrates, fish, and carrion. The California gull has been observed foraging at Harbor Regional Park and Madrona Marsh.
Sterna antillarum browni (nesting colony)	California least tern	FE, SE	High (nesting colony) - High (foraging). It typically prefers seacoast, estuaries, bays and harbors. The least tern is known to nest on Terminal Island. This species has been observed foraging at Harbor Regional Park and Madrona Marsh.
Sterna elegans (nesting colony)	elegant tern	(FSC), CSC	Low (nesting colony) - High (foraging). This species generally breeds in Mexico and extreme southern California. It typically prefers seacoast, estuaries, bays and harbors. The elegant tern has been observed foraging at Harbor Regional Park and Madrona Marsh.

Table 2.4-2. (Continued).

Scientific Name	Common Name	Listing	Potential for Occurrence
ARDEIDAE	HERONS		
Ardea herodias (rookery)	great blue heron	*	Moderate (rookery) - High (foraging). This species prefers wetland and areas of open water. It feeds mostly on fish, but will also consume aquatic invertebrates, small mammals, reptiles, and amphibians. Suitable nesting habitat is located at many sites within the Dominguez Watershed where tall trees occur. This species has been observed in Harbor Regional Park, Madrona Marsh, and in the Dominguez Channel near Vermont Ave. and Artesia Blvd; however, the great blue heron is sensitive to human disturbances, which may prevent successful rookeries within highly urbanized settings.
Casmerodius albus (rookery)	great egret	*	Moderate (rookery) - High (foraging). This species prefers wetland and areas of open water. It feeds mostly on fish and aquatic invertebrates, but will also consume small mammals, reptiles, and amphibians. This species has been observed in Harbor Regional Park, Madrona Marsh, Dominguez Channel (near Vermont Ave and Artesia Blvd.), JWPCP, and Wilmington Drain. Similar to the great blue heron, suitable nesting habitat is located throughout the Dominguez Watershed where tall trees occur; however, this species requires protection from human disturbances, which may prevent successful rookeries within highly urbanized settings.
Egretta thula (rookery)	snowy egret	(FSC)	High (rookery) - High (foraging). This species is widespread in California along shores of coastal estuaries, fresh and saline emergent wetlands, ponds, slow-moving rivers, irrigation ditches, and wet fields. The snowy egret has been observed in Harbor Regional Park, Madrona Marsh, Dominguez Channel (near Vermont Ave. and Artesia Blvd.), and the Wilmington Drain. Suitable nesting habitat is located throughout the Dominguez Watershed.
Nycticorax nycticorax (rookery)	black-crowned night heron	*	High (rookery) - High (foraging). This species typically nests low in trees within densely vegetated marshland habitat. The black-crowned night heron has been observed in Harbor Regional Park (nesting) and Madrona Marsh. Suitable nesting habitat is located throughout the Dominguez Watershed.
Botaurus lentiginosus (nesting)	American bittern	(FSC)	Moderate (nesting) - High (foraging). This species is distributed widely in winter in fresh emergent wetlands. Has been observed at Harbor Regional park and Madrona Marsh.
Ixobrynchus exilis	Least bittern	CSC	High (nesting) – High (foraging). This secretive species is restricted to marshes with emergent vegetation. A small nesting population occurs at Harbor Regional Park in tule-cattail habitat. Suitable nesting habitat is located throughout the Dominguez Watershed.
STRIGIDAE	TRUE OWLS		
Asio otus (nesting)	long-eared owl	CSC	Low (nesting) - Moderate (foraging). This species requires dense riparian vegetation for nesting and is known to use old nests of other birds including crow, hawk, and herons. The long-eared owl has been previously observed in Harbor Regional Park and Madrona Marsh; however, its population has declined range-wide.

Table 2.4-2. (Continued).

Scientific Name	Common Name	Listing	Potential for Occurrence
Speotyto cunicularia (burrow sites)	burrowing owl	(FSC), CSC	Moderate (burrow sites). This species typically nests in old burrows particularly belonging to ground squirrels; however, they may dig their own burrow in soft soil. The burrowing owl has been historically observed within the upland areas of Harbor Regional Park and Madrona Marsh.
THRESKIORNITHIDAE *Plegadis chihi* (rookery)	IBISES white-faced ibis	(FSC), CSC	Low (rookery) - Moderate (foraging). This species generally nests in dense marsh vegetation near water. The white-faced ibis has been observed in Harbor Regional Park; however, its population has declined range-wide.
TROCHILIDAE	HUMMINGBIRDS		
Calypte costae (nesting)	Costa's hummingbird	(FSC)	Low (nesting) - Moderate (foraging). They typically nest on sandy beaches near inlets and bays. The individuals that are observed in California most likely nest in coastal Mexico and islands in the Gulf of California. The Costa's hummingbird has been observed in Harbor Regional Park and Madrona Marsh.
Selasphorus sasin (nesting)	Allen's hummingbird	(FSC)	High (nesting) - High (foraging). This species typically nests in a variety of habitats, utilizing trees including eucalyptus, juniper, and willow as well as vines, shrubs, or ferns. Nests are usually placed in shade of overhanging cover. The subspecies *S. s. sedentarius* is a common resident of the Palos Verdes Peninsula. This species has been observed at Machado Lake, and Madrona Marsh. Suitable habitat for this species may occur in the Linden H. Chandler Preserve, Rolling Hills Canyons (SEA 31), and coastal bluffs along the Palos Verdes Peninsula coastline (SEA 34).
ACCIPITRIDAE	HAWKS		
Accipiter cooperii (nesting)	Cooper's hawk	CSC	High (nesting) - High (foraging). This species typically builds nest sites mainly in riparian growths of deciduous trees, as in canyon bottoms on river flood-plains; also, live oaks, chiefly of open, interrupted or marginal type. The Cooper's hawk has been observed in at the Gardena Willows, Harbor Regional Park (nesting), Madrona Marsh, and Palos Verdes Peninsula. Suitable foraging habitat for this species may occur in the Linden H. Chandler Preserve, Rolling Hills Canyons (SEA 31), and coastal bluffs along the Palos Verdes Peninsula coastline (SEA 34).
Accipiter striatus (nesting)	sharp-shinned hawk	CSC	Low (nesting) - Moderate (foraging). This species is typically found in mixed woodland and nests in ponderosa pine, black oak, and riparian deciduous habitats; however, the complete breeding distribution of this species has not been fully documented. The sharp-shinned hawk has been observed in at the Harbor Regional Park, Madrona Marsh, and Palos Verdes Peninsula. Suitable foraging habitat for this species may occur in the Linden H. Chandler Preserve, Rolling Hills Canyons (SEA 31), and coastal bluffs along the Palos Verdes Peninsula coastline (SEA 34).

Table 2.4-2. (Continued).

Scientific Name	Common Name	Listing	Potential for Occurrence
Elanus leucurus (nesting)	white-tailed kite	(FSC)	High (nesting) - High (foraging). It typically forages in open grasslands, meadow, and marshes. Nesting habitat includes riparian and oak woodland. The white-tailed kite has been previously observed in at the Madrona Marsh (nesting) and Dominguez Channel near Vermont Ave. and Artesia Blvd. Suitable foraging habitat for this species may occur in the Linden H. Chandler Preserve, Rolling Hills Canyons (SEA 31), and coastal bluffs along the Palos Verdes Peninsula coastline (SEA 34).
Circus cyaneus (nesting)	northern harrier	CSC	Low (nesting) - Moderate (foraging). This species typically nests in emergent wetlands or along rivers or lakes. It usually frequents meadows, grasslands, and emergent wetlands. The northern harrier has been observed in at the Harbor Regional Park and Madrona Marsh. Suitable foraging habitat for this species may occur in the Linden H. Chandler Preserve, Rolling Hills Canyons (SEA 31), and coastal bluffs along the Palos Verdes Peninsula coastline (SEA 34).
Pandion haliaetus (nesting)	osprey	CSC	Low (nesting) - Moderate (foraging). This species typically forages over open water habitats. Nests in bare trees, human structures or cliffs. The osprey has been observed in at the Harbor Regional Park and Madrona Marsh.
FALCONIDAE	FALCONS		
Falco columbaris (wintering)	merlin	CSC	Low (nesting) - Moderate (foraging). This species does not usually breed in California. It typically occurs along coastlines, savannahs, woodlands, lakes, and wetlands. The merlin has been observed in at the Harbor Regional Park and Madrona Marsh. Suitable foraging habitat for this species may occur in the Linden H. Chandler Preserve, Rolling Hills Canyons (SEA 31), and coastal bluffs along the Palos Verdes Peninsula coastline (SEA 34).
Falco peregrinus (nesting)	peregrine falcon	SE	Low (nesting) - Moderate (foraging). This species typically nests near wetlands, lakes, rivers, or other water on high cliffs, banks, dunes, mounds. The peregrine falcon has been observed in at the Harbor Regional Park and Madrona Marsh.
TYRANNIDAE	TYRANT FLYCATCHERS		
Empidonax traillii / E. t. extimus (nesting)	willow flycatcher / southwestern willow flycatcher	SE / FE	Moderate (nesting) - Moderate (foraging). This species typically occurs near thickets of low, dense willows located on the edge of meadows, ponds, or backwaters. The willow flycatcher (southwestern) has been historically observed in at the Harbor Regional Park and Madrona Marsh; however, its population has declined range-wide. Suitable foraging and nesting habitat for this species may occur in the willow woodland areas of the Linden H. Chandler Preserve and Rolling Hills Canyons (SEA 31).

Table 2.4-2. (Continued).

Scientific Name	Common Name	Listing	Potential for Occurrence
Empidonax difficilis (nesting)	Pacific slope flycatcher	(FSC)	Moderate (nesting) - Moderate (foraging). This species requires well-shaded areas within woodlands, forests, and canyons with riparian woodlands nearby. Pacific slope flycatcher has been observed in at the Harbor Regional Park and Madrona Marsh.
MUSCICAPIDAE	KINGLETS, GNATCATCHERS		
Polioptila californica californica (nesting)	coastal California gnatcatcher	FT, CSC	High (nesting) – High (foraging). This species is an inhabitant of coastal sage scrub plant communities. Suitable habitat for this species occurs within the upland areas located in Linden H. Chandler Preserve, Rolling Hills Canyons (SEA 31), and coastal bluffs along the Palos Verdes Peninsula coastline (SEA 34).
PARULIDAE	WOOD WARBLERS		
Dendroica petechia brewsteri (nesting)	Yellow warbler	CSC	High (nesting) – High (foraging). This species occurs in riparian woodlands. Requires mature riparian growth for nesting. The yellow warbler has been observed at Machado Lake (nesting) and Madrona Marsh.
Icteria virens	Yellow-breasted chat	CSC	Moderate (nesting) - High (foraging). This species typically inhabits dense thickets near watercourses and willow-riparian areas with a dense understory. The yellow-breasted chat has been observed in at the Machado Lake and Madrona Marsh.
PICIDAE	WOODPECKERS		
Sphyrapicus rubber (nesting)	Red-breasted sapsucker	(FSC)	Low (nesting) - Moderate (foraging). This species prefers mixed deciduous-coniferous woodlands, especially those bordered by riparian areas. Red-breasted sapsucker has been observed at Machado Lake and Madrona Marsh.
LANIIDAE	SHRIKES		
Lanius ludovicianus (nesting)	loggerhead shrike	(FSC), CSC	High (nesting) - High (foraging). This species typically forages in open, brushy areas with scattered shrubs, trees, posts, fences, utility lines, or other perches. The loggerhead shrike has been observed in at the Machado Lake and Madrona Marsh. Suitable foraging habitat for this species may occur in the Linden H. Chandler Preserve, Rolling Hills Canyons (SEA 31), and coastal bluffs along the Palos Verdes Peninsula coastline (SEA 34).
VIREONIDAE	VIREOS		
Vireo bellii pusillus (nesting)	Least bell's vireo	FE, SE	Moderate (nesting) - Moderate (foraging). This species generally occurs in willow woodlands and moist bottomlands. The Least bell's vireo has been historically observed at Machado Lake and Madrona Marsh; however, its population has declined range-wide. Suitable foraging and nesting habitat for this species may occur in the willow woodland areas of the Linden H. Chandler Preserve and Rolling Hills Canyons (SEA 31).

Table 2.4-2. (Continued).

Scientific Name	Common Name	Listing	Potential for Occurrence
CLASS MAMMALIA	MAMMALS		
HETEROMYIDAE *Perognathus longimembris pacificus*	POCKET MICE & KANGAROO RATS Pacific pocket mouse	 FE, CSC	 Moderate. This species prefers soils of fine alluvial sands near the ocean. Inhabits the narrow coastal plains from the Mexican border north to El Segundo, Los Angeles County. Pacific pocket mouse has been historically observed in several locations within the Dominguez Watershed. Suitable habitat for this species may occur in the Linden H. Chandler Preserve, Rolling Hills Canyons (SEA 31), and coastal bluffs along the Palos Verdes Peninsula coastline (SEA 34).
MURIDAE *Neotoma lepida intermedia*	MICE, RATS, AND VOLES San Diego desert woodrat	 CSC	 High. This species exists in coastal southern California from San Diego County to San Luis Obispo County. They prefer moderate to dense canopies. They are particularly abundant in rock outcrops, rocky cliffs, and slopes. The San Diego desert woodrat has been observed on the Palos Verdes Peninsula. Suitable habitat for this species may occur in the Linden H. Chandler Preserve, Rolling Hills Canyons (SEA 31), and coastal bluffs along the Palos Verdes Peninsula coastline (SEA 34).

Status Codes

Federal

FE = Federal-listed; Endangered
FT = Federal-listed; Threatened
(FSC) = Federal Species of Concern; not an active term, and is provided for informational purposes only

State

ST = State-listed; Threatened
SE = State-listed; Endangered
SP = Proposed for State Listing
CSC = California Species of Special Concern

* -- Taxa that are biologically rare, very restricted in distribution, declining throughout their range, or at a critical stage in their life cycle when residing in California.
-- Population(s) in California that may be peripheral to the major portion of a taxon's range, but which are threatened with extirpation within California.
-- Taxa closely associated with a habitat that is declining in California (e.g., wetlands, riparian, old growth forest).

Potential for Occurrence (PFO)

A = Absent – Results of recent focused surveys were negative for a particular species.
L = Low potential for occurrence – Site is within the known range of the species but habitat on the site is rarely used by the species.
M = Moderate potential for occurrence - Both a historical record exists of the species occurring in the project vicinity and limited or marginal diagnostic habitat requirements associated with the species occurs within the project boundaries.
H = High potential for occurrence - Both a historical record exists of the species in the project area or its immediate vicinity or the site falls within designated critical habitat and the diagnostic habitat requirements strongly associated with the species occur in the project area or its immediate vicinity.
P = Species present - The species was observed in the project area at the time of the survey.

Sources

California Natural Diversity Data Base (CNDDB) 2002, Long Beach, San Pedro, Redondo Beach, Torrance, and Inglewood 7.5-minute quads
Ken Malloy Park Master Plan 2002 (Parsons 2002)

2.4.4 Summary of Biological Resources

Several types of habitats occur within the Dominguez Watershed. The largest is urban land that supports few natural resources. Natural habitats account for only 7 percent of land use and 16 percent of the entire watershed. The largest "natural" habitat is associated with the Los Angeles and Long Beach Harbors. Covering 3,289 hectares (8,128 acres), the marine receiving waters of the watershed support over 70 species of fish, 400 species of invertebrates, and 100 species of birds. Over 200 species of birds use the moderate sized habitats at Madrona Marsh and the Ken Malloy Harbor Regional Park, which includes Machado Lake. Several hundred species also use the canyon habitats located in the Palos Verdes Hills.

To a lesser extent, biological resources use several small, disturbed pocket wetlands scattered throughout the watershed, and retention and detention basins located in the City of Torrance. These biological resources within the Dominguez Watershed are highly fragmented and are impacted by a variety of problems directly related to the surrounding urban environment. Encroachment by human populations, impaired water quality, trash, and frequent vegetation clearing required for flood management purposes impact natural habitats.

Exotic vegetation was observed at most of the sensitive habitat areas, although eradication and restoration efforts were evident at Gardena Willows and Madrona Marsh. A Watershed Master Plan will guide restoration efforts at the Ken Malloy Harbor Regional Park, which suffers from water quality impairments, habitat degradation, and various forms of unregulated human and pet disturbances.

Several stresses also affect habitats within the Dominguez Channel. The most notable impact to biological resources is the channelization of drainages throughout the system, many of which are concrete-lined. The man-made channels provide little value to biological resources. In the Dominguez Channel and Wilmington Drain areas where soft-bottom habitat occurs, the physical effects of channelization limit available habitat and its quality related to altered hydrology, sedimentation, and water quality impairments. These physical changes directly affect biological organisms dependent on aquatic or riparian systems including macroinvertebrates and fishes, aquatic or riparian vegetation, and terrestrial animals such as amphibians, birds, and mammals (Bolton and Shellberg 2001; Riley 1998).

Despite these problems, the habitats within the Dominguez Watershed are extremely valuable for locally occurring wildlife and native plants. In addition, several of the species that live or migrate through the watershed are considered sensitive. Seventeen sensitive plant species, including five that are endangered (California orcutt grass, coastal dunes milk-vetch, Lyon's pentachaeta, Mexican flannelbush, salt marsh bird's beak) have the potential to occur. Thirty-eight sensitive wildlife species, including seven endangered or threatened animals (Palos Verdes blue butterfly, California brown pelican, California least tern, coastal California gnatcatcher, least Bell's vireo, southwestern willow flycatcher, Pacific pocket mouse) have the potential to occur.

Many of the conditions that contribute to the degradation of biological resources within the watershed are difficult to rectify (e.g., channelization associated with the flood control system, urbanization); however, the remnant habitats within the system could be improved and managed to maximize their existing biological potential. Several areas are currently provided some level of protection, notably the Significant Ecological Areas such as the canyons in Rolling Hills and Madrona Marsh. Although grass-roots level support for these important habitats provides some level of restoration, these biological resources would benefit from additional rehabilitation support, primarily the removal of exotic species. A recent study conducted for the city of Los Angeles Department of Recreation and Parks identifies several best management options designed to reduce the pollutant load within Machado Lake and surrounding wetlands (Parsons 2002). Strategies identified in that study could be refined to include bioengineering solutions such as incorporating strategically placed treatment wetlands, which would provide improved habitat values in addition to improving water quality (Kadlec and Knight 1996).

2.5 Socioeconomics

The study area for the Dominguez Watershed includes all census tracts that are encompassed by or are intersected by the watershed boundary. For comparison purposes, certain data were also gathered for all cities encompassed by or intersected by the watershed boundary, as well as Los Angeles County.

2.5.1 Population

Regional Context. The Dominguez Watershed is extremely urban. The watershed boundary includes all or part of 17 cities and unincorporated Los Angeles County (Figure 1.1-3). A comparison of the 1990 and 2000 census populations is shown in Table 2.5-1. Table 2.5-1 also includes a 2010 population estimate from the Southern California Association of Governments.

Table 2.5-1. Summary of population, 1990 – 2010.

Jurisdiction	1990	2000	Percent Change 1990-2000	2010	Percent Change 1990-2010
Los Angeles County	8,863,164	9,519,338	7.4	10,785,000	21.7
Carson	83,995	89,730	6.8	101,700	21.1
Compton	90,454	93,493	3.4	102,700	13.5
El Segundo	15,223	16,033	5.3	17,600	15.6
Gardena	49,847	57,746	5.8	64,300	29.0
Hawthorne	71,349	84,112	17.9	82,000	14.9
Inglewood	109,602	112,580	2.7	127,300	16.1
Lawndale	27,331	31,711	16.0	33,900	24.0
Lomita	19,382	20,046	3.4	22,700	17.1
Long Beach	429,433	461,522	7.5	490,400	14.2
Los Angeles	3,485,398	3,694,820	6.0	4,164,600	19.5
Manhattan Beach	32,063	33,852	5.6	35,400	10.4
Palos Verdes Estates	13,512	13,340	-1.3	15,300	13.2
Rancho Palos Verdes	41,659	41,145	-1.2	46,500	11.6
Redondo Beach	60,167	63,261	5.1	68,800	14.3
Rolling Hills	1,871	1,871	0	2,100	12.2
Rolling Hills Estates	7,789	7,676	-1.5	8,900	14.3
Torrance	133,107	137,946	3.6	145,600	9.4
Dominguez Watershed Census Tracts	947,773	978,699	3.2	Not Available	Not Available

Sources: U.S. Census Bureau 2002 and 1992; SCAG 2001

In general, the jurisdictions experienced growth from 1990 to 2000 at a similar rate as Los Angeles County (7.4 percent from 1990 to 2010). The City of Hawthorne had the greatest percent change, at 17.9 percent during the same time period. The City of Rolling Hills experienced no change in population, and the cities of Palos Verdes Estates, Rancho Palos Verdes, and Rolling Hills Estates experienced a decrease in population of 1.3 percent, 1.2 percent, and 1.5 percent, respectively.

Los Angeles County is expected to increase by 21.7 percent from 1990 to 2010. The percent growth for the cities during the same time period is expected to range from 9.4 percent (Torrance) to 29.0 percent (Gardena).

Dominguez Watershed. Table 2.5-1 also summarizes the 1990 and 2000 census populations for the census tracts that are included in or intersect the Dominguez Watershed. The population in these census tracts increased by 3.2 percent during this time period, which is a smaller increase than Los Angeles County as a whole (7.4 percent). The 2010 population estimate is not available at the census tract level. As can be seen in Figure 2.5-1, population was fairly evenly distributed in the watershed, with denser populations in the northern portion of the watershed.

A summary of racial characteristics in the Dominguez Watershed census tracts is presented in Table 2.5-2. The watershed has a higher percentage of Black and Asian populations than Los Angeles County as a whole. Hispanic population in the watershed was slightly lower than the county as a whole. As can be seen in Figure 2.5-2, nearly all of the census tracts have a higher percentage of total minority population than Los Angeles County as a whole.

Table 2.5-2. Summary of economic characteristics for Dominguez Watershed Census Tracts, 2000.

Category	Dominguez Watershed	Los Angeles County
Percent of Population Below Poverty Level	15.3	17.9
Median Family Income	$43,049	$46,452

2.5.2 Housing

In 2000, there were 346,631 housing units in the watershed census tracts. The vacancy rate for the Dominguez Watershed census tracts was approximately 3.8 percent. This vacancy rate is below that of the county (4.2 percent). A vacancy rate between 3 percent and 5 percent is considered normal and low enough to ensure the continued upkeep of rental properties, but high enough to keep housing costs down. Approximately 50.9 percent of the occupied housing units were owner occupied. This is higher than Los Angeles County as a whole, where approximately 47.9 percent of the occupied housing units were owner-occupied (U.S. Census Bureau 2002).

2.5.3 Economics

Figure 2.5-3 identifies the percent of population in each census tract that was below the federal poverty level for the 2000 census. Approximately 15 percent of the total population in the Dominguez Watershed census tracts was below the poverty level. In comparison, approximately 18 percent of the total population of Los Angeles County was below the poverty level for the 2000 census (U.S. Census Bureau 2002).

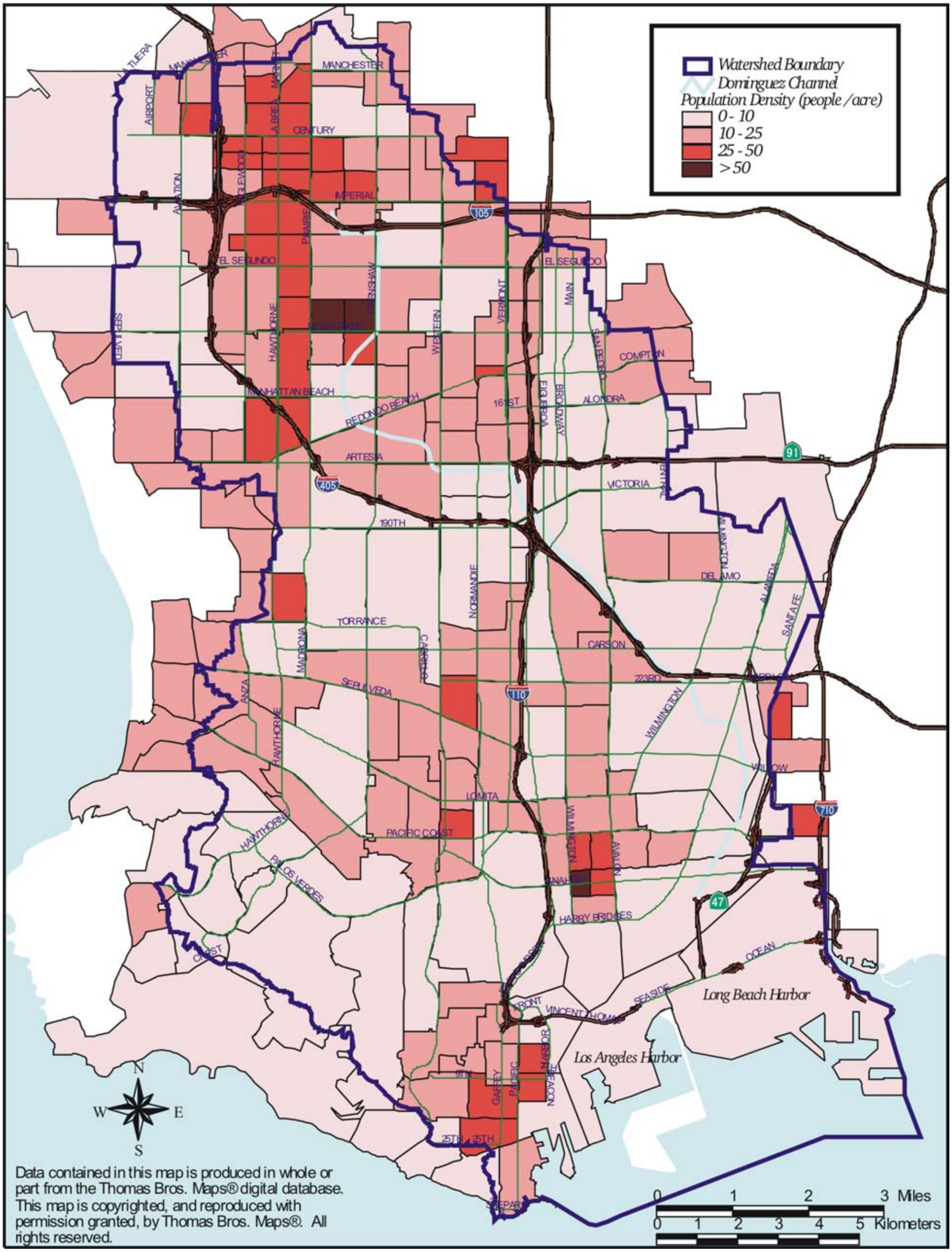


Figure 2.5-1. Population density within the Dominguez Watershed, 2000.

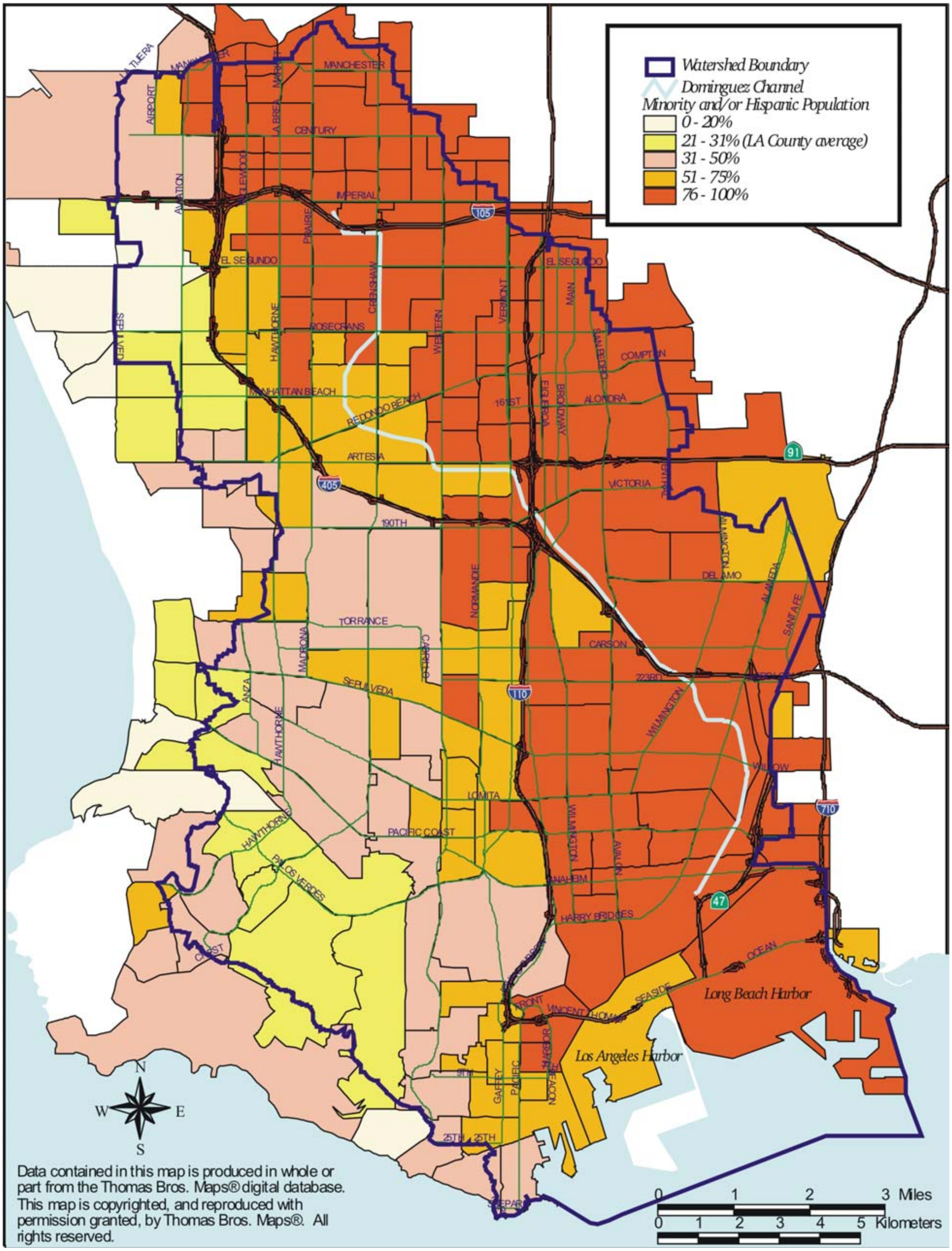


Figure 2.5-2. Percentage of minority population greater than the Los Angeles County average, 2000.

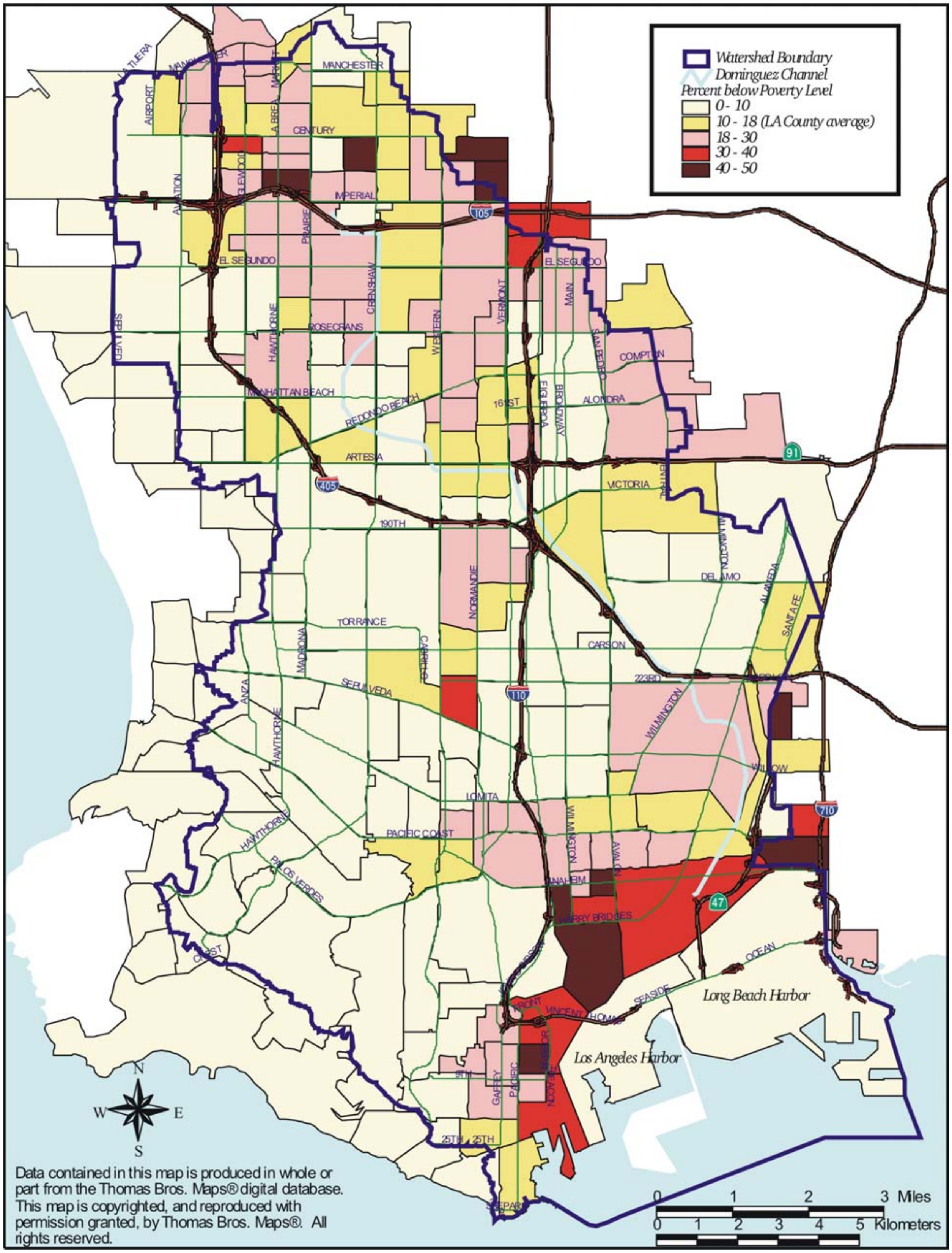


Figure 2.5-3. Poverty level density within the Dominguez Watershed, 2000.

2.6 Data Gaps

2.6.1 Physical Conditions

No data gaps affect the existing condition descriptions for climate, air quality, geology, soils, or seismic hazards.

Limited soil contamination information, which was discussed in the physical condition section, as well EPA information on brownfield sites indicate that soil contamination may be an important consideration for some potential restoration projects. Information on soil contamination will need to be addressed on a case-by-case basis for selected potential restoration sites. Information on locations of brownfields that may provide opportunities for restoration is identified as a data gap for the land use section (see below).

2.6.2 Land Use

Open Space Considerations

Given that most of the land in the watershed is built out, little opportunity remains to conserve open space except in the low, density communities of Palos Verdes Hills, and those communities already have conservation as a key element of their General Plans. For other communities, creative ways will need to be considered to create open space opportunities. The following data gaps were identified to address the types of information that would be useful for identifying potential open space creation locations.

- Locations of brownfield sites that may provide opportunities for restoration to open space.
- Information regarding vacant land within the watershed, including ownership, cost, use constraints (including soil contamination potential).
- Locations and information (ownership, use constraints) on unused right-of-way easements, utility easements, detention basins, degraded channels, or other lands within the watershed that may provide open space/recreation opportunities.
- Types of incentives that could be used to encourage increased open space creation with redevelopment.

Water Supply Considerations

Diminishing water supply is a major concern for most jurisdictions. While sufficient information was available to understand the problem, limited information was gathered to assist with development of potential watershed management solutions. Filling the following data gaps could be useful for planning purposes.

- Percent use of drought tolerant vegetation in parks, schools, and public landscape areas.
- Existing costs for irrigation of parks, public buildings, school grounds, landscape medians.
- Cost savings to cities within the watershed that use recycled water for landscape irrigation.

2.6.3 Water Resources

Monitoring programs have been conducted in the Dominguez Watershed since the 1940's by various agencies with different monitoring objectives. Although there have been many studies conducted there are still areas of the watershed where data gaps exist.

There is no water quality data readily available for the Rolling Hills area including the Gaffey Street Drain and other channels/streams in that area. This area mostly drains into the Harbors Subwatershed.

Data on aquatic species within the Dominguez Channel is limited. The 1975 LARWQCB study of aquatic biota in the channel may need to be updated with a current analysis of channel conditions.

Although there is some data available for specific areas along the Dominguez Channel the LARWQCB (2001b) reports that little recent data exist for the Dominguez Channel even though the channel contains heavy industrial facilities, including the former Montrose site. The data that does exist is primarily concerned with small runoff areas and/or specific land use categories. It has only been in the last year that a mass emissions monitoring station has been established at the most downstream point of the Dominguez Channel before the Channel becomes tidally influenced. This station has only monitored one storm to date.

Although each individual discharger (municipal and industrial) has its own monitoring program, there is no centralized database available to access for water quality information. Also, since each discharger monitors a different set of parameters, with varying detection limits and program guidelines (e.g. frequency of sampling), it is very difficult to do a comprehensive evaluation on the data that is available.

There is also little data available as to direct and indirect sources of contamination. Some contaminants such as PAHs can be attributed to the burning of hydrocarbons and potential sources can be targeted. Other contaminants such as bacteria are ubiquitous and finding a potential source can be challenging. More data is needed to identify sources of contamination within the watershed.

There are some ongoing water quality projects in the watershed that have been initiated to fill some of the known data gaps in the watershed. The following list was provided by Mr. Andrew Jirik of the Port of Los Angeles (2003) and is a brief overview of ongoing (project is completed or underway but data is not available at this time) or proposed projects within the Dominguez Watershed:

- The LARWQCB (2001b) has started their Surface Water Ambient Monitoring Program (SWAMP). They are focusing on the Dominguez Watershed and have already conducted bacterial sampling in June 2002 (see Section 2.3.4.3). Additional sampling is scheduled to coordinate with the Bight '03 program in 2003. The program divides the Watershed into six subareas: headwater streams, inner and outer harbors of Los Angeles and Long Beach, Madrona Marsh, Machado Lake, Dominguez Channel estuary and the upper channelized segment of Dominguez Channel above normal tidal influence. The program will include a randomized probabilistic sample design modeled after the EPA's EMAP Program, especially in the harbor area. The triad approach (toxicity, chemistry and benthic community) will be applied when applicable. Some proposed studies for this program include:

- SCCWRP in conjunction with the LARWQCB, City of Los Angeles, Ports of Los Angeles and Long Beach, Western States petroleum Association (WSPA), and the Lawrence Livermore and Lawrence Berkley National Laboratories is conducting a study and developing a dynamic water quality model for the Dominguez Watershed and estuary. This model will access the contributions from each of the sources, an understanding of how the discharged pollutants commingle, transform or degrade as they move downstream, and the eventual fate of the cumulatively discharged pollutants in San Pedro Bay. Stakeholders will be able use the model to not only assess relative contributions at any point in the channel, but to also evaluate the effectiveness and efficiency of any proposed management actions as part of the TMDL implementation plan. (www.sccwrp.org)

- A study in Machado Lake looking at fish tissue analysis in conjunction with water column chemistry and toxicity, sediment chemistry and toxicity, and pathogens.

- A study in the Los Angeles and Long Beach Harbors that will include:
  - Five weeks of coliform and pathogen testing in the summer and winter,
  - Water quality toxicity and chemistry,
  - Metals chemistry,
  - PAH analysis, and
  - Potential TIEs.

- The Board (2001) has also targeted the Dominguez Watershed for the fiscal year 2002-2003 to collect, analyze and store data for the State of the Watershed Report and TMDL development.

- The EPA was scheduled to sample for DDT at over one hundred sites from the former Montrose Chemical site down to Consolidated Slip during August and September of 2002.

- SCCWRP will be conducting a Southern California Bight Regional Monitoring Program in 2003 (Bight '03). This is a follow up to the Southern California Bight Regional Monitoring Programs in 1994 and 1998. The study area covers the West Coast from South of Point Conception to Mexico. Data collected includes water quality, benthic infauna, macro fauna and fish, sediment toxicity, sediment chemistry, fish tissue, and beach microbiology. The program will likely include sampling locations in Los Angeles and Long Beach Harbors and could include sampling in the Dominguez Channel Estuary if the participants agree on priority. Field efforts are planned for the summer of 2003.

- The Dominguez Watershed Dry Weather Monitoring Program was proposed for a Proposition 13 Grant. The sampling program will monitor dry weather runoff and inputs to all segment of the watershed including freshwater, estuarine and marine environments. Dry weather contributions are important to understand, since these flows can be more easily addressed through BMPs. Understanding constituents of concern and dry weather flow volumes will be important features of this monitoring program. The proposed monitoring plan was not recommended for funding during the latest round of proposition 13 grant awards.

- The Pollutant Transport Study for the Estuarine/Marine Component was awarded a Proposition 13 Grant during the latest round of funding. The study will include the deployment of field instruments and modeling to build upon existing data and models regarding the interaction between Dominguez Channel and the harbor. The pollutant transport study will also add information to the TMDL program.

- SCCWRP, along with other contributors, is conducting a three-year project estimating the pollutant inputs to Santa Monica Bay and its watershed via aerial deposition. The Los Angeles metropolitan area has some of the worst air quality in the nation. Aerial deposition is one source that is virtually unmonitored and whose contribution to the overall pollutant load is not well known (SCCWRP

2003). This SCCWRP project will characterize the air pollution sources, measure the nutrients, trace metals and organic constituents and make mass balance measurements for aerial deposition and storm water runoff. Although this study targets the Santa Monica Bay Watershed, the Dominguez Watershed is subject to many of the same aerial pollutants. Results from this study may provide some insight into water quality issues within the Dominguez Watershed.

- The Contaminated Sediment Task Force's Sediment and Storm Water Database is near completion (scheduled for completion in 2003). The database will be a compilation of sediment quality and storm water runoff data for the Los Angeles Region.

- LACDPW is required under its current NPDES municipal storm water permit to perform an estuary assessment and monitoring program. The study calls for twenty-five monitoring stations to be sampled for sediment chemistry and toxicity, and benthic infauna. The project may occur in conjunction with the Bight '03 program in 2003.

- Water column and biota sampling of the Dominguez Channel were conducted in 2001-2002 to assess the impact of the Del Amo Bridge construction.

- A sediment investigation was conducted in Consolidated Slip by Ogden /CH2Mhill in 2002.

2.6.4 Biological Resources

Habitats have not been mapped throughout the watershed, therefore, baseline acreage for natural habitat areas are not available. This information would be useful for monitoring change in habitats over time in response to enhancement and restoration efforts, and should be included in the design of those efforts.

No information was gathered on biological resources within the lower Dominguez Channel with the exception of bird observations. Information on the benthic invertebrates living within the soft bottom of the estuarine channel and the occurrence of fish would provide additional information on the quality of waters and the habitat.